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JOSEPH T. SINGEWALD, JR., *Director*

BULLETIN 14

THE WATER RESOURCES OF HOWARD AND MONTGOMERY COUNTIES

THE GROUND-WATER RESOURCES

By R. J. Dingman and Gerald Meyer

THE SURFACE-WATER RESOURCES

By Robert O. R. Martin

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PREFACE

Bulletin 14 is the seventh of a series of reports on the surface-water and ground-water resources of the counties of Maryland. The first five reports cover the five Coastal Plain counties of Southern Maryland. They are being supplemented by a bulletin dealing with the ground-water resources of Southern Maryland as a unit. The ground-water resources in the Coastal Plain of the Baltimore Industrial Area are described in Bulletin 4. The sixth report of the series of county reports is on the water resources of Garrett County. It is the first county report in the Appalachian Province.

Bulletin 14 is the first report on the water resources of counties in the Piedmont Province. Because of the similarity in the physiography and underlying geology in Howard and Montgomery Counties, the description of the water resources has been combined into a bi-county report. Detailed geologic maps of both counties have been published. A report describing the geology of the two counties is being prepared.

Bulletin 14 was prepared under the cooperative investigations of the water resources of Maryland by the United States Geological Survey and the Maryland Department of Geology, Mines and Water Resources, and is published with the permission of the United States Geological Survey. The section on ground waters was prepared by R. J. Dingman and Gerald Meyer of the United States Geological Survey on the cooperative ground-water staff in Maryland and the section on surface waters by Robert O. R. Martin of the United States Geological Survey on the cooperative surface-water staff in Maryland.

JOSEPH T. SINGEWALD, JR. DIRECTOR

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THE WATER RESOURCES OF HOWARD AND MONTGOMERY COUNTIES

The Ground-Water Resources*

BY

R. J. DINGMAN AND GERALD MEYER

Abstract

Howard and Montgomery Counties are in central Maryland, just west of a line joining Washington, D. C., and Baltimore. They are within the Piedmont province except for a narrow zone in the Coastal Plain province along the eastern edge of Howard County. The Piedmont part is underlain by crystalline rocks of pre-Cambrian(?) and early Paleozoic age and, in the western part of Montgomery County, by consolidated sedimentary rocks of Late Triassic age. The Coastal Plain part of Howard County is underlain by unconsolidated sedimentary rocks of Early Cretaceous age. In places thin unconsolidated sedimentary deposits of Tertiary and Quaternary ages cap hills, form valley-side terrace deposits, and occur as valley alluvium.

Approximately 4,500,000 gallons of ground water are pumped daily in Howard and Montgomery Counties. As most of the area is underlain by crystalline rocks, they are utilized more extensively for ground-water supplies than are the sedimentary rocks. The ground water occurs essentially under water-table conditions, but artesian conditions occur locally. Ground water is stored and transmitted chiefly through fractures in the unweathered crystalline and indurated sedimentary rocks, and through intergranular interstices in the weathered mantle rock and the unconsolidated sedimentary rocks.

Depths of wells in the crystalline rocks range from 20 to 750 feet and yields range from a fraction of a gallon to about 180 gallons per minute. Specific capacities range from less than 0.1 to 7.5 gallons per minute per foot of drawdown. The magnitude of well yields is related to depth of the well, its topographic position and geologic setting, and the thickness of the weathered-rock mantle in its vicinity.

Stream-flow and precipitation data for the Rock Creek basin show that over long periods of time the discharge from, or effective recharge to, the ground-water reservoir of the basin is about 20 percent of precipitation and loss by evaporation and transpiration is about 71 percent of precipitation.

Measurements of water levels in observation wells show no appreciable net

* The geologic nomenclature in this report is that of the Department of Geology, Mines and Water Resources and differs somewhat from the official usage of the U. S. Geological Survey.

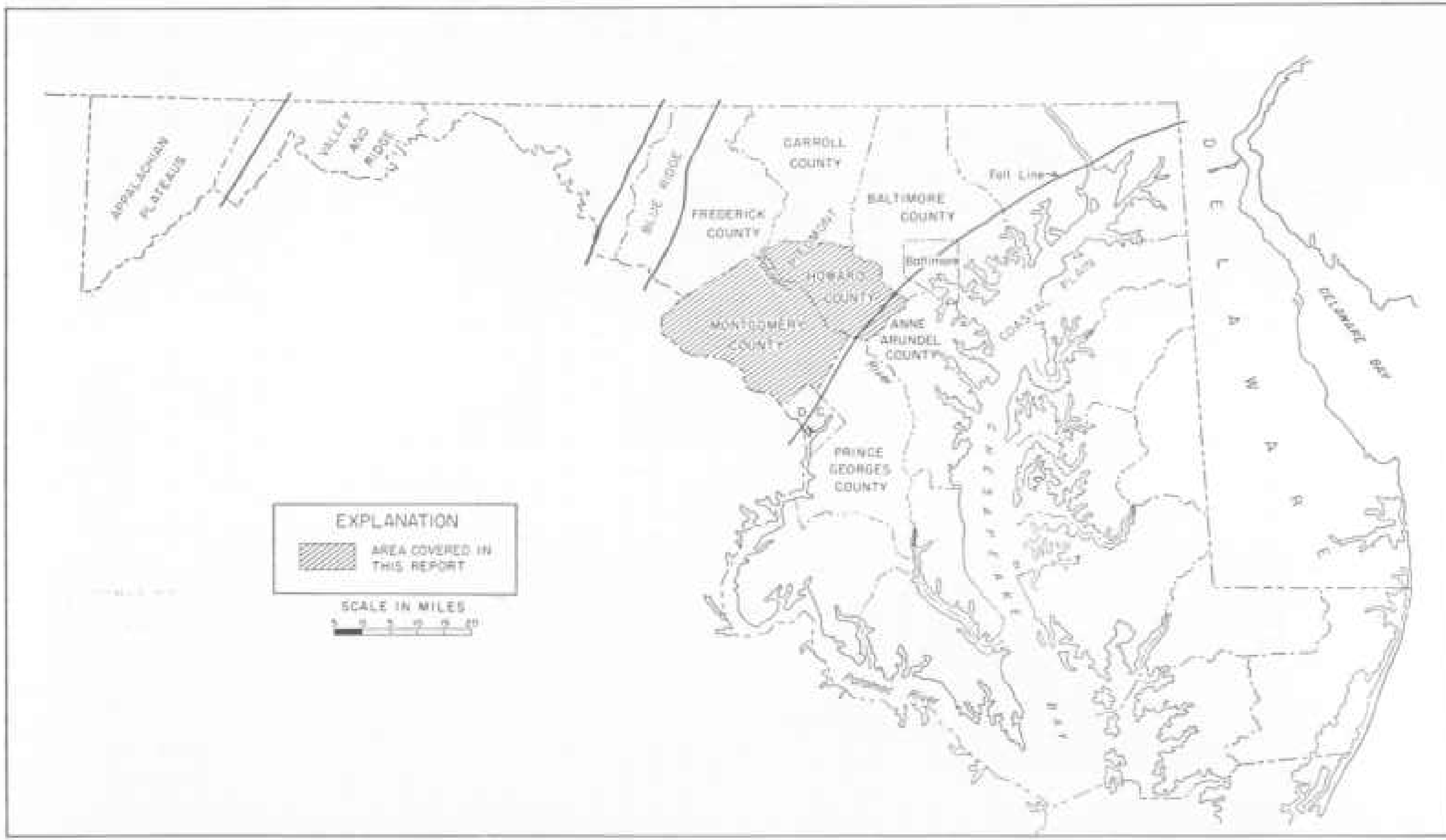

FIGURE 1. Map of Maryland Showing Physiographic Provinces and Area Covered in this Report

change in most wells. Locally, heavy pumping or cessation of heavy pumping have resulted in declines and rises, respectively, in water levels. Seasonal fluctuations correlate with precipitation and changes in rates of evaporation and transpiration.

The chemical character of the ground water is related to the chemical composition of the rocks. In general, the water is low in mineral content and is satisfactory for most uses; but locally the water is corrosive, contains large amounts of iron, or is hard.

INTRODUCTION

LOCATION OF THE AREA

Howard and Montgomery Counties are in central Maryland just west of a line joining Washington, D. C., and Baltimore (fig. 1). Howard County is bounded on the north by the Patapsco River and the South Branch of the Patapsco River, on the southwest by the Patuxent River, and on the southeast by the Baltimore and Ohio Railroad. Montgomery County is southwest of Howard County, the Patuxent River forming the boundary between the two counties, and is bounded on the west and southwest by the Potomac River, on the northwest by Frederick County, and on the southeast by Prince Georges County and the District of Columbia.

PURPOSE, SCOPE, AND METHODS OF INVESTIGATION

The purpose of the investigation was to obtain basic data and general information on the ground-water resources in Howard and Montgomery Counties. It is the first of the series of investigations of the water resources of counties in Maryland within the Piedmont area. The investigation included a study of the lithologic and hydrologic characteristics of the geologic formations, their utilization as sources of ground water, and the chemical quality of the water they contain. The field work was begun in June 1952 and was essentially completed by March 1953.

A systematic inventory of 684 wells and springs was made in the two counties (Tables 1 and 2). The logs of 180 wells were compiled from drillers' records (Tables 3 and 4). Water samples from 33 wells or springs were analyzed for chemical constituents by the Quality of Water Branch of the United States Geological Survey, and 36 analyses were obtained from the Maryland State Health Department and other sources (Tables 16 and 17).

The fluctuations of water levels were determined by periodic measurements or continuous recordings in nine observation wells. Fluctuations of the water level in well Mont-Eg 1 at Colesville have been recorded for the past 21 years by the Surface Water Branch of the U. S. Geological Survey.

The wells inventoried are numbered according to a coordinate system. On the left and right sides of the well-location map of each county (Pls. 1 and 2) upper-case letters designate 5-minute intervals of latitude, and on the top and bottom of the maps lower-case letters designate 5-minute intervals of longitude. The 5-minute quadrangle formed by the intersection of the lines of latitude and longitude is identified by a combination of the coordinate letters. The abbreviations for Howard or Montgomery County are placed in front of the coordinate letters to differentiate between the two sets of well numbers. The wells in each 5-minute quadrangle are assigned consecutive numbers in the order in which they were recorded.

PREVIOUS STUDIES

The occurrence of ground water in Howard and Montgomery Counties is discussed briefly in a report on the water resources of Maryland, Delaware and the District of Columbia, by Clark, Mathews, and Berry (1918, pp. 431–437). The report contains records of 15 wells in Howard County and 47 wells in Montgomery County. The ground-water conditions at several small localities in the area were studied by members of the U. S. Geological Survey during the past few years, and the unpublished data have been used in this report.

ACKNOWLEDGMENTS

The drillers of wells in Howard and Montgomery Counties were very cooperative in providing information on wells drilled prior to this study. The Maryland State Department of Health provided chemical analyses and records of some wells. The investigation was under the general supervision of A. N. Sayre, chief of the Ground Water Branch of the U. S. Geological Survey, and under the immediate supervision of R. R. Bennett, district geologist in charge of the cooperative ground-water investigations in Maryland.

ECONOMY AND CULTURE

Howard County has an area of 251 square miles of which approximately 78 percent is used for agricultural purposes (Maryland State Planning Commission, 1950, p. 34). The dairy industry is the largest single source of agricultural income. The most important crops are wheat, barley, corn, and hay. Beef, pork, and poultry also are produced in substantial quantities.

The population of Howard County was 23,119 in 1950. Elkridge, with a population of 2,250, and Ellicott City, the county seat, with a population of 2,200, are the two largest towns.

Montgomery County has an area of 494 square miles of which approximately 78 percent is used for agricultural purposes (Maryland State Planning Commission, 1950, p. 38). The agricultural development is similar to that of Howard County, but the dairy industry is proportionately more important. The part of the county adjacent to the District of Columbia is urban and densely populated but the rest of the county is mostly rural. The tremendous increase in residential building in the area adjacent to the District of Columbia during the past decade resulted in an increase of approximately 100 percent in the population of Montgomery County between 1940 and 1950. The population in 1950 was 164,401.

Only light industry has been established in Howard and Montgomery Counties—hardwood lumber milling, food canning, sand and gravel mining, and minor manufacturing.

CLIMATE

The average annual precipitation, based on five stations with long-term records in or near Howard and Montgomery Counties, is 41.11 inches. The annual precipitation is rather evenly distributed throughout the year, the average monthly precipitation reaching a maximum of approximately 4.5 inches in July and a minimum of approximately 2.8 inches in October (fig. 9). The mean annual temperature is approximately 55°F., for the eastern part of the area and about a degree or two lower for the western part. The last killing frost usually occurs late in March and the first killing frost late in October or early in November.

GENERAL GEOLOGY AND HYDROLOGY

Except for a narrow zone along the eastern edge of Howard County, both counties lie within the Piedmont province (fig. 1).

Most of Montgomery and Howard Counties is underlain by ancient crystalline rocks of pre-Cambrian(?) or early Paleozoic age (Pl. 3). They extend beneath consolidated sedimentary rocks of Triassic age in the western part of the area and beneath unconsolidated sedimentary rocks of Cretaceous age in the eastern part. The crystalline rocks are chiefly schist, phyllite, and gneiss, with smaller amounts of migmatite, granite, gabbro, quartzite, marble, and dikelike intrusives of granite pegmatite and diabase. A mantle of disintegrated and decomposed rock generally overlies the fresh rock.

Triassic sedimentary rocks, consisting of purple to red sandstone and shale, gray arkosic sandstone, and a basal conglomerate, underlie the western part of Montgomery County. Locally these rocks are intruded by diabase dikes and sills.

A narrow zone along the eastern edge of Howard County is underlain by unconsolidated Coastal Plain sediments of continental origin, consisting chiefly of lenticular beds of sand, gravel, clay, and sandy clay of Early Cretaceous age. These deposits overlie the eroded surface of the crystalline rocks (bedrock). They are a part of the Patuxent formation. Dipping gently to the southeast, they form a wedgelike body having a maximum thickness of about 140 feet. Small areas a little farther west in east-central Howard County, and similar small areas in eastern Montgomery County, also are covered by these Cretaceous rocks, occurring generally as isolated remnants capping hills.

In some parts of the area thin deposits of unconsolidated gravel, sand, and clay of Tertiary and Quaternary ages cap hills, form valley-side terrace deposits, and occur as alluvium in the bottom of valleys.

The boundary between the Coastal Plain and the Piedmont is called the Fall Line (fig. 1). The geologic sections in Plate 4 show the relation between the unconsolidated sediments of the Coastal Plain and the crystalline rocks of the Piedmont in the vicinity of the Fall Line in Howard and Montgomery Counties.

The occurrence of ground water in Howard and Montgomery Counties is largely dependent on the character, areal extent, and structure of the rock formations. In general the ground water moves downward and laterally from upland areas to lowland areas where it is discharged in springs and streams. Although locally the water passes beneath laterally extensive bodies of rock of low permeability and becomes confined under artesian pressure, the ground water occurs predominantly under unconfined or water-table conditions.

As most of the area is underlain by crystalline rocks, they are utilized more extensively for ground-water supplies than are the sedimentary rocks. The openings in the unweathered crystalline rocks that contain or transmit water are chiefly joints and other fractures; but, in the mantle of weathered rock, water occurs in pores between the particles of rock. Most of the ground water in the crystalline rocks circulates in the shallow, more permeable part and most of the water for wells is derived from it.

In the indurated Triassic sedimentary rocks, water is contained in and transmitted through intergranular pore spaces in sandstone and fracture openings in both sandstone and shale.

Water in the unconsolidated Cretaceous and Quaternary deposits occurs in the pore spaces of the sand, gravel, and clay. Circulation of the ground water is greatest in the porous and permeable beds of sand and gravel, and least in the porous but relatively impermeable clay and sandy clay. The largest supplies of water from wells in the Cretaceous and Quaternary deposits are obtained from the beds of sand and gravel.

The character and water-bearing properties of the geologic formations are described in Table 5, and the character and water-bearing properties of the various crystalline rock types are described in Table 6.

OCCURRENCE OF GROUND WATER

GENERAL PRINCIPLES

In Howard and Montgomery Counties ground water is derived entirely from precipitation. Some of the precipitation flows directly from the land surface into streams as surface runoff, some is returned to the atmosphere by evaporation, and some percolates downward into the ground. Some of the

TABLE 5

Geologic Formations in Howard and Montgomery Counties

System	Series	Group	Formation	Approximate thickness (feet)	General character	Water-bearing properties
Quaternary	Recent			0–50±	Alluvium in valleys of large streams. Gravel, sand, and silt.	Unimportant because of small areal extent and thinness. Supply water to a few dug wells. Where these deposits occur near large streams, conditions for induced recharge may be favorable.
	Pleistocene			0–50±	Coarse quartz, quartzite, or chert gravel in tan or orange matrix of sand or silt.	Unimportant because well drained, thin, and of small areal extent. Supply water to some dug wells.
Tertiary (?)	Pliocene(?)					
Cretaceous	Lower Cretaceous	Potomac	Patuxent	0–140±	Nonmarine varicolored kaolinitic clay, quartz gravel, and light-colored sand; in places indurated by iron oxide.	Important water-bearing formation only in eastern Howard County near Anne Arundel County boundary. Known yields range from 8 to 35 gallons per minute and average 14 gallons per minute.
Triassic	Upper Triassic	Newark	New Oxford	0–1,500(?)	Nonmarine clastic sediments; red sandstone and shale, gray or yellowish arkosic sandstone, and basal conglomerate.	Important water-bearing formation in western Montgomery County. Known yields range from 2 to 30 gallons a minute and average 10 gallons a minute. No "dry holes" known.
Early Paleozoic and pre-Cambrian(?)					Chiefly schist, phyllite, and gneiss; some granite, gabbro, quartzite, and marble; pegmatite and diabase dikes.	Important water-bearing formations; underlie most of Howard and Montgomery Counties. Water chiefly in joints and other fractures. Yields range from a fraction of a gallon to 183 gallons a minute. Some "dry holes" drilled in certain areas.

TABLE 6

Crystalline Rocks in Howard and Montgomery Counties

Rock type	Geologic unit	Lithology	Water-bearing properties
Schist and phyllite	Wissahickon formation, albite facies Wissahickon formation, oligoclase facies Harpers phyllite Ijamsville phyllite	Banded or laminated quartz-muscovite schist and phyllite of various compositions; may be rich in chlorite, albite, or oligoclase.	Domestic supplies available practically everywhere; larger supplies available in some areas, particularly from the albite facies of the Wissahickon formation. Yields of 256 wells in these units range from 0.2 to 183 gallons per minute and average 20 gallons per minute.
Granitic and gneissic rocks	Baltimore gneiss Sykesville formation Laurel gneiss Kensington granite gneiss Ellicott City granite Guilford granite Relay quartz diorite	Mostly biotite granite, rich in wall-rock inclusions. Gneisses are highly foliated. Sykesville formation may be a granitized schist.	Domestic supplies available practically everywhere; larger supplies may be obtained in some localities. Yields of wells range from 2 to 30 gallons per minute and average 11 gallons per minute.
Pegmatite		Coarsely crystalline pegmatites composed of variable amounts of orthoclase, quartz, muscovite, and biotite.	Relatively unimportant as an aquifer because of small areal extent. Domestic supplies readily available; larger supplies may be obtained at the contact of pegmatite and the country rock.
Gabbro, diabase, tonalite and other basic rocks		Gabbro in Howard County is rich in hornblende. Diabase occurs as dikes and sills.	Yields of 11 wells range from 2 to 40 gallons per minute and average 11 gallons per minute.

Marble	Cockeysville marble	Coarsely crystalline white marble, dolomitic in some areas.	Probably is one of the better aquifers in Howard County but is of small areal extent. Yields of 5 wells range from 3 to 40 gallons per minute and average 25 gallons per minute.
Quartzite	Setters formation	Coarse-grained quartzite, with associated mica schist, and gneiss.	Unimportant as an aquifer because of small areal extent. Yields small to moderate quantities of water for domestic or limited commercial use.

water that enters the ground is returned to the atmosphere through transpiration or evaporation before reaching the water table. Only part of the precipitation replenishes, or recharges, the ground-water reservoirs. Water is discharged from the ground-water reservoirs through springs or by seepage into streams, through evaporation and transpiration, and through wells.

The percentage of the total volume of a rock that is occupied by interstices is its porosity. The porosity of the sedimentary materials and of the weathered mantle of the crystalline rocks is high, except where the weathered material is only partly decomposed or the sediments are poorly sorted, consolidated, or cemented. In the unweathered crystalline rocks ground water occurs chiefly in joints and other fractures which make up only a small percentage of the total rock volume. The porosity of these rocks is, therefore, low.

The permeability of a rock is a measure of its ability to transmit water. Whereas the porosity refers to the total volume of pore spaces or other openings, permeability is governed chiefly by the number, size, and degree of interconnection of the pore spaces or other openings. Thus, the permeability of a rock is not necessarily proportional to its porosity. Clay is highly porous, but its interstices are so small that they are filled largely with water that clings to the rock particles by molecular attraction, and the water does not move freely through them; hence its permeability is low. In sand and gravel, however, the much larger interstices enable the water to be transmitted freely, and the permeability of these materials is high. Secondary cementation, compaction, and consolidation reduce the permeability of a rock. Permeability of unweathered crystalline rock is determined chiefly by the character of the joints and other fractures. Where weathered the crystalline rock may be a permeable sandlike material or an impermeable clay or silt, depending on the degree of weathering and the nature of the original rock.

Ground water occurs under two types of conditions, water-table and artesian. Water-table conditions exist where the water-bearing material that makes up the ground-water reservoir is not overlain by impervious rock and water from precipitation may directly enter the reservoir by downward percolation. The upper surface of the saturated zone, which is under atmospheric pressure, is called the water table. Its position is marked by the static water level in wells. Artesian conditions are formed where the water that moves along the water-bearing bed passes beneath relatively impervious rock and is confined under pressure. If an artesian reservoir is penetrated by a well, the water level in the well will rise above the bottom of the confining rock or bed; the water is artesian whether or not it rises to or above the land surface. The imaginary surface coinciding with the levels to which water rises in wells penetrating an artesian reservoir is called the piezometric surface. In Howard and Montgomery Counties practically all the ground water occurs essentially under water-table conditions; artesian conditions are local.

The ground-water reservoirs in Howard and Montgomery Counties discharge water continuously, but at varying rates, by both natural and artificial means. In comparison with the quantity of ground water discharged naturally, the discharge by artificial means, consisting almost entirely of water pumped from wells, is extremely small.

Natural discharge of ground water occurs through springs, through direct discharge of ground water into stream beds, through evaporation, and through transpiration by plants. It is the continuous discharge of ground water through springs or into streams that maintains the flow of the streams despite the intermittency of precipitation.

The ground-water reservoirs in Howard and Montgomery Counties are recharged with water from precipitation. The normal annual precipitation is about 41 inches, but only a small percentage of this water reaches the ground-water reservoirs. The important factors that determine the amount of rainfall that becomes ground water are (1) duration, intensity, and periodicity of the rainfall, (2) shape of the land surface, (3) type of soil or rock at the surface, and (4) type and density of vegetation. Field studies to determine the recharge quantitatively have not been made.

OCCURRENCE OF GROUND WATER IN THE SEDIMENTARY ROCKS

General Description of Geologic Units

Indurated rocks of Triassic age and unconsolidated sediments of Early Cretaceous, Pliocene(?), Pleistocene, and Recent ages underlie parts of Howard and Montgomery Counties.

New Oxford formation

Upper Triassic consolidated sedimentary rocks, predominantly clastics consisting of red sandstone and shale, gray or yellowish arkosic sandstone, and a basal conglomerate in the extreme western part, cover about 15 percent of the area of Montgomery County. Red shale and brown, red, or gray sandstone alternate in beds whose thickness varies but generally is between 10 and 30 feet. After the Triassic rocks were laid down on the eroded surface of the older crystalline rocks, both they and the crystalline rocks were intruded by diabase dikes and sills. Bodies of diabase are found in Howard as well as Montgomery County. The Triassic sedimentary rocks dip westward about 2° to 25°. They belong to the New Oxford formation, a part of the Newark group. Their maximum thickness, near the Potomac River in Montgomery County, is about 1,500 feet.

Patuxent formation

Near the Fall Line the crystalline rocks are overlain by a relatively thin cover of unconsolidated sediments of the Patuxent formation of Early Cretaceous age. The Patuxent formation is the basal formation of the series of Coastal Plain sediments which underlie a large part of eastern Maryland. In Howard or Montgomery County its thickness does not exceed about 140 feet, but it thickens rapidly eastward. As Howard County extends eastward beyond the Fall Line for a greater distance than does Montgomery County, the Patuxent formation is thicker and more extensive in Howard County. In Montgomery County the Patuxent formation is confined to a belt about a mile wide along the boundary with Prince Georges County, and occurs largely as discontinuous outliers. In eastern Howard County the formation crops out in a belt about 5 miles wide in the northern part and narrows to about 2 miles in the southern part. In Howard County, as in Montgomery County, it occurs as discontinuous outcrops capping hills, but toward the east it becomes thicker, and near the Anne Arundel County border its outcrop is almost continuous. The formation is composed of continental sediments, consisting of lenticular beds of varicolored kaolinitic clay, quartz gravel, and light-colored sand, which in places are indurated or stained by iron oxide.

Pliocene(?) deposits

Small remnants of alluvial deposits of sand, gravel, and silt of Pliocene(?) age cap the upland areas in the vicinity of the Fall Line, either overlying the Cretaceous sediments or resting on the crystalline rocks. Typically they are composed of coarse quartz, quartzite, or chert gravel in a tan or orange sand or silt matrix. Their maximum thickness probably is not more than 50 feet.

Pleistocene and Recent deposits

Younger but similar gravel, sand, and silt deposits of Pleistocene age occur in the vicinity of the Potomac River, capping hilltops or terraces. They do not exceed 50 feet in thickness and are of small areal extent.

At lower elevations, sand, gravel, silt and clay of later Pleistocene age and Recent age form alluvial flood-plain deposits of variable width and depth in the valleys of the Potomac River and the large tributary streams (Pl. 5). These deposits attain their greatest width, approximately a mile, in the valley of the Potomac River a few miles west of the confluence of Seneca Creek and the Potomac. In most streams, however, the width of the flood-plain deposits is considerably less, or they may be absent. Their maximum thickness probably does not exceed 40 or 50 feet.

Water-Bearing Properties of the Sedimentary Rocks

New Oxford formation

The New Oxford formation is an important aquifer in western Montgomery County. Numerous drilled wells and some dug wells derive water from these rocks for domestic and farm use; no large public-supply, institutional, or commercial wells obtain water from them.

The porosity of the shale and fine-grained sandstone that make up most of the New Oxford formation is controlled in part by the shape and arrangement of the particles composing the rocks and by the degree of assortment of the particles, but secondary factors have altered greatly the porosity. Compaction and cementation have reduced appreciably the original porosity. Fractures, on the other hand, have materially increased the porosity. Enlargement of the fractures by ground-water solution has further increased the porosity. In general, the permeability of these sediments, which is dependent largely on the fracturing, decreases with depth; and below a few hundred feet, where fractures are small and less numerous, the permeability may be very low. However, it is likely that intergranular openings in some of the sandstone beds persist below the shallow fracture zones, and hence these beds may be fairly permeable at depth. In general, the transmissibility of the New Oxford formation, or the rate at which it transmits water, increases westward toward the Potomac River, the direction in which it thickens; but this increase may be relatively small, for below a few hundred feet the rocks are poorly permeable.

Water is obtained from joints and other fractures in sandstone and shale and from intergranular openings in the sandstone. A typical well probably derives water from both types of rock and from both types of openings. Because the water in these rocks occurs partly in fracture openings, which are not distributed uniformly, and because distribution of the individual sandstone and shale units of the formation has not been determined, it is difficult to foretell accurately the depth of well required for a water supply in a specific locality. However, the depth of wells in the vicinity of a proposed drilling site may indicate the approximate depth required to obtain a satisfactory water supply. The wells inventoried range in depth from 11.5 feet in a dug well (Mont-Db 9, 1 mile west of Poolesville) to 231 feet in a drilled well (Mont-Db 13, 3 miles southwest of Poolesville); they average about 100 feet. Yields range from about 2 to 30 gallons a minute and average about 10 gallons a minute. The highest yield of 30 gallons a minute was reported for well Mont-Cb 11 (1 mile southwest of Dickerson), which is 6 inches in diameter and 94 feet deep. None of the wells were reported to be "dry holes." Specific capacities (yield in gallons per minute per foot of drawdown) as determined from data supplied by drillers range from less than 0.1 gallon per minute to about 0.6 gallon per minute per foot of drawdown. The specific capacity of well Mont-Dc 3, on the contact between the New Oxford formation and the Ijamsville phyllite and presumably deriving water from both formations, is 3.3.

The length of the casing in the wells has a wide range; and, unlike the length of casing in crystalline-rock wells, does not usually indicate the depth of the weathered zone, but rather the depth to a hard bed of shale or sandstone in which the driller seated the casing. Little is known about the water-bearing character of the weathered mantle of the New Oxford formation. In general it probably is poor water-bearing material, for almost without exception it is cased off by drillers. Dug wells are easily constructed in the weathered rock and softer beds of unweathered rock. Generally dug wells obtain adequate supplies for domestic use.

Patuxent formation

The Patuxent formation contains important water-bearing sand and gravel lenses in Howard County in the area between U. S. Highway 1 and the Anne Arundel County border. Water supplies for many filling stations, tourist courts, and other commercial establishments, as well as for domestic use, are derived from it. To the west of this area in Howard County, and near the Prince Georges County border in Montgomery County its outcrop is dissected by many streams. Consequently, it is thin, of small areal extent, and well drained and thus does not generally furnish adequate and dependable supplies of water. Although some domestic dug wells and a few drilled wells in these small areas derive water from the Patuxent formation, most wells are drilled through it into the crystalline rocks.

The porosity of the Patuxent sediments varies primarily in accordance with the shape, arrangement, and degree of sorting of the particles of clay, sand, and gravel composing them. Compaction and cementation have not reduced appreciably the porosity, although locally it is reduced by cementation with iron oxide deposited from ground water. Relatively little mineral matter is removed by ground-water solution, for the rocks are composed largely of silicates that are not readily soluble. Well-sorted clay, sand, or gravel lenses are highly porous, but in lenses composed of mixtures of these the porosity is reduced. The permeability of the sand and gravel lenses is high, except where mixed with clay. "Clay balls," small masses of clay disseminated through the sand and gravel in places, reduce the permeability less than the clay that fills the intergranular spaces. Because of its low permeability, the clay forms confining beds for artesian water in the water-bearing sand and gravel lenses. The transmissibility of the Patuxent formation probably increases eastward, the direction in which it thickens, and probably is greatest in Howard County near the Anne Arundel County boundary.

In eastern Howard County wells in the Patuxent formation penetrate alternately various thicknesses of clay and sand and, in the lower part, gravel. Generally casing is extended to the water-bearing bed to be utilized, and a well screen is set opposite the bed. In some wells the water-bearing bed is left unscreened and in some the drill hole is filled with gravel opposite the water-bearing bed. The wells inventoried range in depth from 26 feet in a dug well (How-Df 2, 1 mile east of Savage) to approximately 150 feet in a drilled well, (How-Df 5 near Annapolis Junction). Yields range from 8 to 35 gallons a minute and average about 14 gallons a minute. The highest yield was reported for well How-Df 1, near Annapolis Junction, the farthest down dip well.

Yields adequate for domestic or small commercial needs are readily obtainable from the sediments of the Patuxent formation in eastern Howard County, where it is thickest, and no doubt wells of higher yield could be constructed by screening more than one water-bearing sand. Specific capacities of three wells in the Patuxent formation are 0.6, 1.7, and 2.0 gallons per minute per foot of drawdown.

Pliocene(?), Pleistocene, and Recent deposits

The Pliocene(?), Pleistocene, and Recent deposits underlie only small areas of Howard and Montgomery Counties and are utilized very little for water supplies.

The porosity and permeability of these deposits are governed by the same factors that control the porosity and permeability of the Patuxent formation. Clean and uniform Pleistocene and Recent stream gravel and sand deposits may be the most porous and permeable rock in the area, but they are of small areal extent. Commonly, the Pliocene(?), Pleistocene, and Recent gravel and sand are mixed with silt or clay which reduces their porosity and permeability appreciably. The transmissibility of these deposits is variable, depending upon their lithologic character and saturated thickness. Because they are thin and usually only partly saturated, appreciable changes in transmissibility may occur as fluctuations of the water table change the saturated thickness.

Pliocene(?) and Pleistocene deposits underlying upland areas supply water to a number of dug wells, but these deposits are generally thin and well drained, and wells are drilled through them into the underlying crystalline rocks. Fairly extensive flood-plain deposits of Pleistocene and Recent ages occur in the valleys of some of the major streams, especially the Potomac River, but little is known of their water-bearing character and thickness. In places the permeability, lateral extent, and thickness of the alluvium may be sufficient to permit development of substantial quantities of water, perhaps more than from any other aquifer in the area, provided that sufficient recharge can be induced from the adjacent streams. However, the alluvium in Piedmont streams generally is narrow and thin, and in many places it may be in large part composed of relatively poor water-bearing materials such as clay and silt. The thickness, areal extent, and permeability of the alluvium, and its hydraulic connection with the associated stream, should be determined before an attempt is made to develop a water supply in it.

Test borings about three-quarters of a mile south of Simpsonville, Howard County, in alluvium along the west bank of Middle Patuxent River, show that it consists of silty sand and clay overlying coarse sand and gravel. One boring shows that the alluvium is 15 to 18 feet thick about 25 feet from the stream. Apparently none of the other borings, which are only 7 to 9 feet deep, penetrated the alluvium completely. As the alluvial deposits are only about

250 feet wide and rather thin, they are too small to store large quantities of water, and development of a successful water supply at this site would depend largely on how much water could be induced from the river. The quantity of recharge supplied by the river would depend upon the degree of hydraulic connection between the river and the permeable gravel and sand deposits beneath the alluvial flat, the thickness, permeability, and lateral extent of the deposits, the difference in head between the river level and the pumping level in the wells, the distance from the stream to the wells, and the temperature of the stream water and ground water. The logs of two of the test borings are:

Test boring no. 1 (about 25 feet west of river)	Depth (feet)
Alluvial deposits	
Sand, medium, to silt, brown	0–7
Clay, gray	7–8
Sand, coarse, and small gravel, predominantly light gray	8–12
Sand, coarse, and small gravel, gray; some brown clay	12–15
Alluvial deposits and crystalline bedrock(?):	
Gravel, very coarse, and sand; grains predominantly angular; some brown clay	15–18

Test boring no. 5 (about 100 feet west of river)	Depth (feet)
Alluvial deposits:	
Silt, sandy, reddish-brown	0–3.5
Sand, medium to coarse	3.5–5
Sand, coarse, some gravel	5–7
Gravel, brown	7–9

Recharge, Movement, and Discharge of Ground Water in the Sedimentary Rocks

Because the sedimentary rocks of Howard and Montgomery Counties are of varied geologic and hydrologic character, the movement of ground water is not uniform and in some areas is extremely complex.

Recharge to the sedimentary rocks is not uniform because the permeability of the soil and rock, density of vegetation, and topography vary from place to place. In general, in the water-table areas of the less heterogeneous rocks, such as parts of the Patuxent formation and the Pliocene(?) and Pleistocene deposits, water moves downward through the soil zone and underlying unsaturated rock to the water table. It then moves in a general arcuate pattern from the interstream areas to the areas of low water table in the valleys. Figure 2 is a sectional view of the pattern of ground-water flow in a perfectly uniform aquifer in the vicinity of a stream. Though none of the rock in Howard and Montgomery Counties is perfectly uniform, the pattern is applicable in a general way to water-table areas of the less heterogeneous rocks. Where permeable sedimentary rocks are underlain by rocks of much less permeability, such as the crystalline rocks, circulation of the ground water is restricted largely to the sedimentary rocks. The paths of ground-water flow are crowded

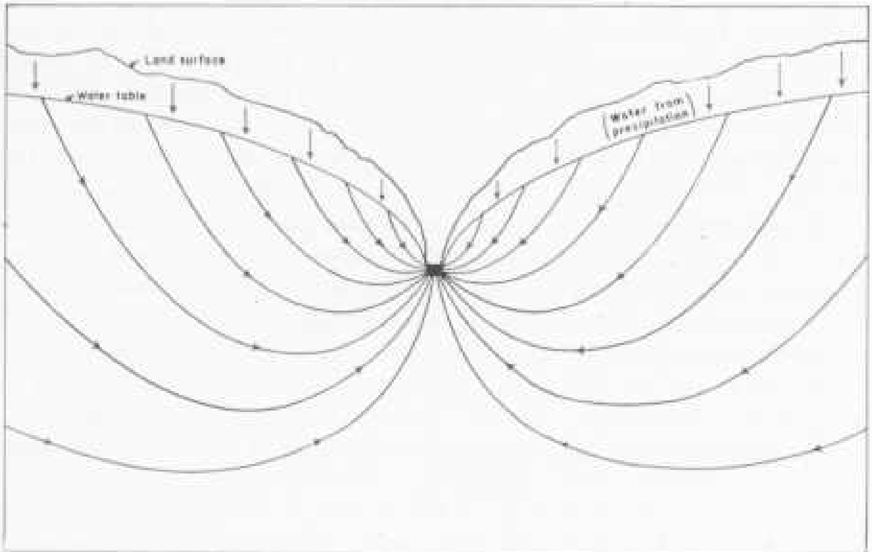

FIGURE 2. Schematic Cross Section Showing the General Pattern of Ground-Water Flow Toward a Stream

together in the more uniform and permeable sedimentary rocks, and are widespread and circuitous in the jointed and less permeable crystalline rocks. Bennett and Meyer (1952, pp. 103–109) have described in greater detail the movement of ground water in unconsolidated sedimentary rocks.

New Oxford formation

The circulation of ground water in the Triassic sedimentary rocks is complex, because the water is transmitted through both fracture openings and pore spaces between rock particles. The structure of the rocks is similar to that of the Coastal Plain sediments, being a series of inclined parallel beds. Such structure generally forms artesian conditions, so that artesian conditions probably occur in some parts of the Triassic rocks. However, the artesian conditions probably do not extend over a wide area because fracturing of the rocks reduces the effectiveness of confining beds. Thus, the ground water occurs predominantly under water-table conditions, with movement of the water from interstream areas toward the streams.

Patuxent formation

Locally water occurs under artesian conditions in the Coastal Plain sediments in Howard and Montgomery Counties, especially along the eastern edge of Howard County where the Patuxent formation contains a thick section of lenticular beds of sand, gravel, and clay. Where sand or gravel aquifers are overlain by lenticular clay beds, ground water moves slowly down the dip from the outcrop, part of it continuing down the dip and out of the area, and a part moving upward around—and to a small extent through—the clay beds, and becoming a part of the shallow ground-water reservoir. As the areas of sedimentary rocks in Howard and Montgomery Counties are incised by streams, and confining beds are generally of limited lateral extent and resist the upward movement to different degrees from place to place, the artesian systems are only imperfectly developed. Movement of the ground water is extremely complex, whereas if all the conditions of a typical artesian aquifer were present the pattern of movement would be more uniform.

Ground water in the Patuxent formation occurs, therefore, mainly under water-table conditions. Part of the precipitation that becomes ground water is discharged to streams in a manner approximating that shown in figure 2, part is discharged by evaporation and transpiration, and part moves down the dip where it may be confined, imperfectly, beneath the relatively impermeable clay lenses in the formation. Part of this artesian water continues down the dip into southern Maryland, and a part moves upward through the confining beds, or laterally and upward around them, and becomes a part of the shallow groundwater near the land surface.

Pliocene(?), Pleistocene, and Recent deposits

Water in the Pliocene(?), Pleistocene, and Recent deposits occurs essentially under water-table conditions. Where the deposits consist of clean sand and gravel at the land surface, the recharge may be high; but commonly the sand or gravel deposits are intermixed with clay, or clay may be the predominant material, and the recharge may be lower and surface runoff high. In most places the deposits are thin and overlie crystalline rocks of much lower permeability; thus movement of the ground water may be largely lateral, towards the edges of the upland deposits and toward nearby streams in the alluvial lowland deposits.

OCCURRENCE OF GROUND WATER IN THE CRYSTALLINE ROCKS

General Description of Geologic Units

Howard and Montgomery Counties are underlain by early Paleozoic and pre-Cambrian(?) crystalline rocks of many types. These rocks are covered by Cretaceous sedimentary rocks in the eastern part of the counties and by Triassic rocks in the western part of Montgomery County. Although many rock types (gneiss, schist, migmatite, quartzite, marble, granite, gabbro, serpentine, and others) occur, most of the area of the two counties is underlain by the Wissahickon formation and the Ijamsville phyllite. The Sykesville formation and the Baltimore gneiss underlie two wide semiparallel north-south-trending areas of Howard County, and the Sykesville formation extends for some distance into Montgomery County. The rest of the crystalline-rock area of the two counties is underlain by relatively small masses of other types of igneous or metamorphic rock. Table 6 gives a summary of the lithology and water-bearing properties of the crystalline rocks.

The crystalline rocks of Howard and Montgomery Counties may be loosely classified into two major types: (1) thoroughly metamorphosed sedimentary rocks and (2) intrusive igneous rocks that, since their injection, have been metamorphosed to varying degrees. In their original state the two types of rock differed greatly in geologic character and hydrologic properties. The igneous rocks were dense and massive and of very low porosity and permeability; the sedimentary rocks must have had a high porosity and, in part, were relatively permeable. These widely differing types of rock were subjected to extreme heat and pressure, as well as to the chemical action of solutions given off by other cooling igneous rocks. Their mineral grains were rearranged, crushed and stretched, and new minerals were formed. The original rock textures were almost obliterated by the intense folding and recrystallization.

Water-Bearing Properties of the Crystalline Rocks

In crystalline rocks, the percentage of pore space is very small. Buckley (1898, p. 400–403) made laboratory determinations of the porosity of crystalline rocks and obtained results ranging from 0.02 to 0.56 percent. (See also Table 7.) The pore spaces are usually of subcapillary size so that water is transmitted

TABLE 7

Porosity of Various Rocks (Adapted from a table compiled by M. L. Fuller (1906, p. 61))

Rock[1]	Porosity (percent by volume)			
	Number of tests	Minimum	Maximum	Average
Granite, schist, and gneiss	14	0.02	0.56	0.16
Granite, schist, and gneiss	22	.37	1.85	1.2
Gabbro	1	—	—	.84
Diabase	2	.90	1.13	1.01
Sandstone	16	4.81	28.28	15.89
Sandstone	—	3.46	22.8	10.22
Quartzite	1	—	—	.8
Quartzite	—	—	—	.21
Slate and shale	11	.53	13.36	4.85
Sand (uniform)	Many	26	47	35
Sand (mixture)	Many	35	40	38
Clay	Many	44	47	45

[1] Rock types listed twice indicate independent porosity determinations by two analysts.

very slowly, if at all, through them. It is unlikely that wells obtain any significant quantity of water from the pores of the massive rocks.

Since joints and other fractures are the only openings in the crystalline rocks through which water may move with sufficient rapidity and in sufficient volume to supply a well, their permeability is largely determined by the size and extent of the fractures. The different types of openings in the crystalline rocks and the geologic processes forming them are discussed by Cloos (1937). With respect to the occurrence of ground water, the most important of these openings probably are the joints. A joint may be defined as an opening or fracture of great length and depth as compared to its width. There are usually two systems of joints at right angles to each other and a third system crossing them at oblique angles. Joints occur at intervals ranging from a few inches, or less to several hundred feet. Ellis (1909, p. 70) estimated that wells drilled in the crystalline rocks of Connecticut intercepted an average of seven joints in the first 200 feet. Some of the drillers' logs of wells in the Piedmont of Maryland record encountering "seams." "Seam" is the drillers' term for large fractures, most of which probably are joints, or quartz veinlets which may occupy fracture openings. In the logs of wells How-De 13 and 14 twelve seams were reported in less than 100 feet. If the seams reported by the drillers are joints, the jointing at these wells is more closely spaced than the average spacing in Connecticut. Too few of these detailed logs are available and they are concentrated in too small an area to permit general conclusions as to the spacing of joints in the crystalline rocks of Howard and Montgomery Counties.

Joint systems may be observed in deep road cuts or in the numerous quarries in the area. The quarries in the Setters formation, on both sides of the Patapsco River near the town of Woodstock, show a very well developed system of joints (Pl. 5, fig. 2). The joints near the surface of the unweathered rock may be several inches across. These relatively wide openings result from the slow decomposition and solution of some of the minerals in the rocks by ground water. The width of the joints decreases rapidly so that near the bottom of the quarry walls the width of most of the joints is only a fraction of an inch. The width of the joints probably continues to decrease with depth until they are only hairline cracks or even invisible or "incipient" joints.

Well drillers occasionally report that, when drilling in the crystalline rocks, their drilling tools suddenly drop, perhaps several inches or more, as though the drill penetrated an open space in the rocks. It is unlikely that openings of this magnitude are common in the crystalline rocks, except in marble, which is easily dissolved by ground water. More likely, dropping of the drilling tools indicates that the drill has passed through a joint along which the rocks have been decomposed and are clayey and soft.

In areas where rocks have been intruded, there may be a zone of shearing of the country rock along its contacts with the intrusive rock. Wells How-De 16 and De 17 (1½ miles north of Scaggsville) were drilled in a contact zone between the schist of the Wissahickon formation and an intrusive body of quartz-mica pegmatite. The relatively large yields from these wells probably are caused by larger or more numerous openings produced by shearing near the contact of the intrusive body.

Faults are another type of opening that may increase the porosity of the crystalline rocks. A fault is a fracture along which there has been appreciable slippage. The crushing and fracturing associated with faulting of crystalline rocks may produce a zone that is more porous and permeable than the original rock. Well Fr-Fd 9, in eastern Frederick County, 3 miles south of Buckeystown near the northwestern boundary of Montgomery County, was drilled into a fault at the contact of a quartzite and a limestone. It was reported that the drill penetrated clay and mud for the entire depth of the well (over 200 feet) and that, although the well did produce water, it had to be abandoned because the water was extremely muddy. The crushed material, or gouge, in the fault zone probably had been reduced to a claylike consistency, either by the mechanical action of the faulting or by decomposition of the original gouge by ground water circulating along the fault zone.

Because of their large areal extent, the crystalline rocks are the most important aquifers in Howard and Montgomery Counties. Except for wells in the areas underlain by Triassic sedimentary rocks and the Patuxent formation, practically all the drilled wells obtain water from the crystalline rocks. Ground-water supplies adequate for domestic and farm use can be obtained practically everywhere in the crystalline rocks, although in a few localities it may be necessary to drill at several sites before completing a successful well. In some localities supplies of ground water adequate for commercial or municipal use are available from the crystalline rocks. Approximately 750,000 gallons per day of ground water is pumped from wells in these rocks for municipal and other uses in Rockville and vicinity.

The depths of wells in the crystalline rocks range from 20 to 750 feet and yields range from a fraction of a gallon to 183 gallons per minute. The specific capacities range from less than 0.1 to 7.5 gallons per minute per foot of drawdown. However, these figures may not mean much because the specific capacity in a rock well changes if the water level is drawn below the main water-bearing zone. The specific capacity of 7.5 reported for well Mont-Eh 9 may be abnormally high because a layer of gravel, which is probably a good water bearer, immediately overlies the crystalline rocks in the vicinity of this well.

The yields of wells are a guide to the permeability of an aquifer. In the crystalline rocks there is considerable variation in yield of wells within short distances because of changes in the number and size of fractures, as well as in geologic structure, rock type, and topography. Therefore, the results of an analysis of yields of wells may be applied only in a general way to a specific locality.

The importance of the various factors that affect the yields of wells in the crystalline rocks are revealed by statistical analyses. Such analyses are based on the relation of well yields to the depth of the well, its topographic position, and geologic setting, and the thickness of the weathered-rock mantle in the vicinity. The reliability of the analyses depends on the accuracy of the data. Although data from Howard and Montgomery Counties were so analyzed, some of the data are not accurate and the limitations of the analyses should be recognized. Data on the depth of the wells and the length of the casings, which were obtained largely from well drillers, are reasonably accurate. The accuracy of the data on yield of the wells is variable, chiefly depending upon the duration of the pumping or bailing test and on whether the well was tested at full capacity. Ordinarily a well for domestic use is tested only to determine if it will yield the desired quantity of water but the capacity of the well may be considerably greater. On the other hand, commercial, industrial, and municipal wells are usually tested at full capacity so that the reported yields for those wells are more representative.

The topographic position of each well—whether on a hillside, in a valley or draw, etc.,—was determined at the time the well was inventoried. However, there is no precise dividing line between the topographic classifications and their identification is subject to personal interpretation. A draw generally enlarges downslope and becomes a valley, and there is no definite point where the draw ends and the valley begins; a well in the transition zone might be placed in either of the two classifications. (Fig. 7A.)

Relation of yield of wells to rock type

Although the same basic principles of occurrence of ground water apply to all the crystalline rocks, variations in lithology and structure of the various rock units result in differences in their water-bearing properties. As an extreme example, in the area between Damascus (Montgomery County) and Ridgeville (Carroll County) numerous wells were reported with poor yields, reflecting low permeability in the Ijamsville phyllite in that area.

The wells whose yields are summarized in Table 8 and figure 3 fall into three groups—those having average yields of 2 to 5 gallons per minute, 8 to 14 gallons per minute, and 24 to 32 gallons per minute.

The Relay quartz diorite, Triassic diabase, Ellicott City granite, serpentine, and Setters formation comprise the first group (average yields of 2 to 5 gallons per minute). As they are of small areal extent, few wells have been drilled in these formations. Hence, few hydrologic data are available for them, and the average yield figures may not be truly representative of the water-bearing character of these rocks. With additional data the average yield figures for the Setters formation, and perhaps the other formations, might be considerably larger. The jointing in the Setters formation (Pl. 5, fig. 2) is well developed and if the jointing persists at depth, the formation would be fairly permeable.

TABLE 8

Average Depth and Yield of Wells in Howard and Montgomery Counties by Geologic Units

Geologic unit	Howard County			Montgomery County			Howard and Montgomery Counties combined		
	Number of wells	Average yield (g p m)	Average depth (feet)	Number of wells	Average yield (g p m)	Average depth (feet)	Number of wells	Average yield (g p m)	Average depth (feet)
Relay quartz diorite	1	2	55	—	—	—	1	2	55
Diabase (Triassic)	1	4	43	—	—	—	1	4	43
Ellicott City granite	2	4	184	—	—	—	2	4	184
Serpentine	—	—	—	3	5	62	3	5	62
Setters formation	2	5	134	—	—	—	2	5	134
Ijamsville phyllite	11	5	118	38	10	116	49	8	117
Sykesville formation	6	9	50	5	9	78	11	9	63
New Oxford formation	—	—	—	23	9	120	23	9	120
Pegmatite	3	10	124	—	—	—	3	10	124
Gabbro	41	11	133	—	—	—	41	11	133
Laurel gneiss	—	—	—	11	11	109	11	11	109
Baltimore gneiss	10	12	101	—	—	—	10	12	101
Kensington granite gneiss	—	—	—	8	12	132	8	12	132
Guilford granite	3	13	46	—	—	—	3	13	46
Basic igneous rocks	—	—	—	11	13	91	11	13	91
Patuxent formation	8	14	108	—	—	—	8	14	108
Wissahickon fm., oligoclase facies	40	12	115	40	16	126	80	14	120
Wissahickon fm., albite facies	8	3	81	120	26	137	128	24	134
Cockeysville marble	5	25	136	—	—	—	5	25	136
Contact zones	2	44	81	5	26	118	7	32	107
Harpers phyllite	—	—	—	2	32	105	2	32	105

The largest number of formations are in the second group (average yields of 8 to 14 gallons per minute). The geologic units in it are Ijamsville phyllite, Sykesville formation, New Oxford formation, pegmatite, gabbro, Laurel gneiss, Baltimore gneiss, Kensington granite gneiss, Guilford granite, basic igneous rocks, and the Wissahickon formation (oligoclase facies). Adequate data are available only for the Ijamsville phyllite, gabbro, and the oligoclase facies of the Wissahickon formation; hence, the average yields of the wells in these formations probably are more nearly representative of the true water-bearing conditions than are the average yields determined for the other rock units.

The average yield of 49 wells in the Ijamsville phyllite was 8 gallons per minute. The lowest yield reported for a well in this formation was 0.2 gallon per minute and the highest was 30 gallons per minute. As shown by the low average yield, relatively low maximum yield, and the large proportion of

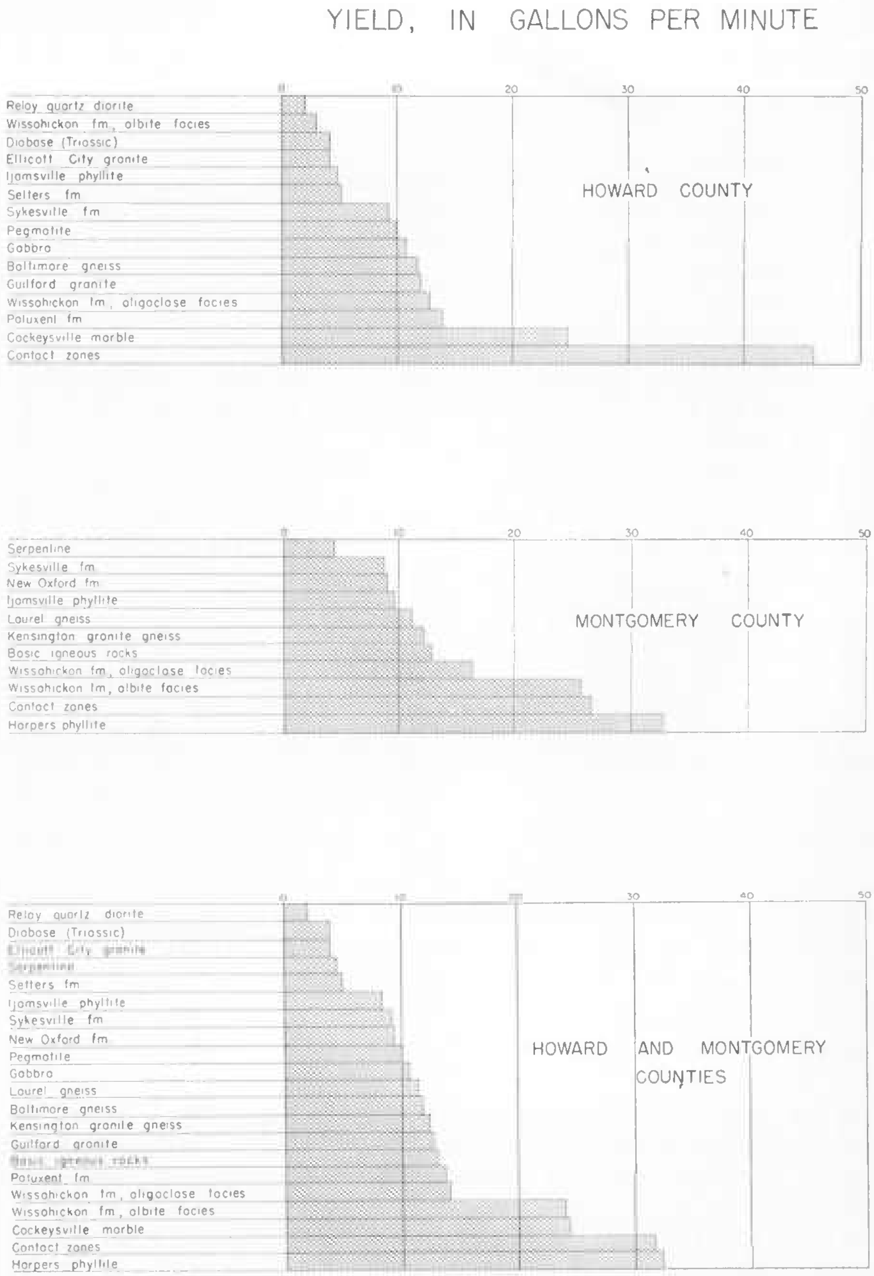

FIGURE 3. Graphs Showing the Relation of Yield of Wells to Rock Units

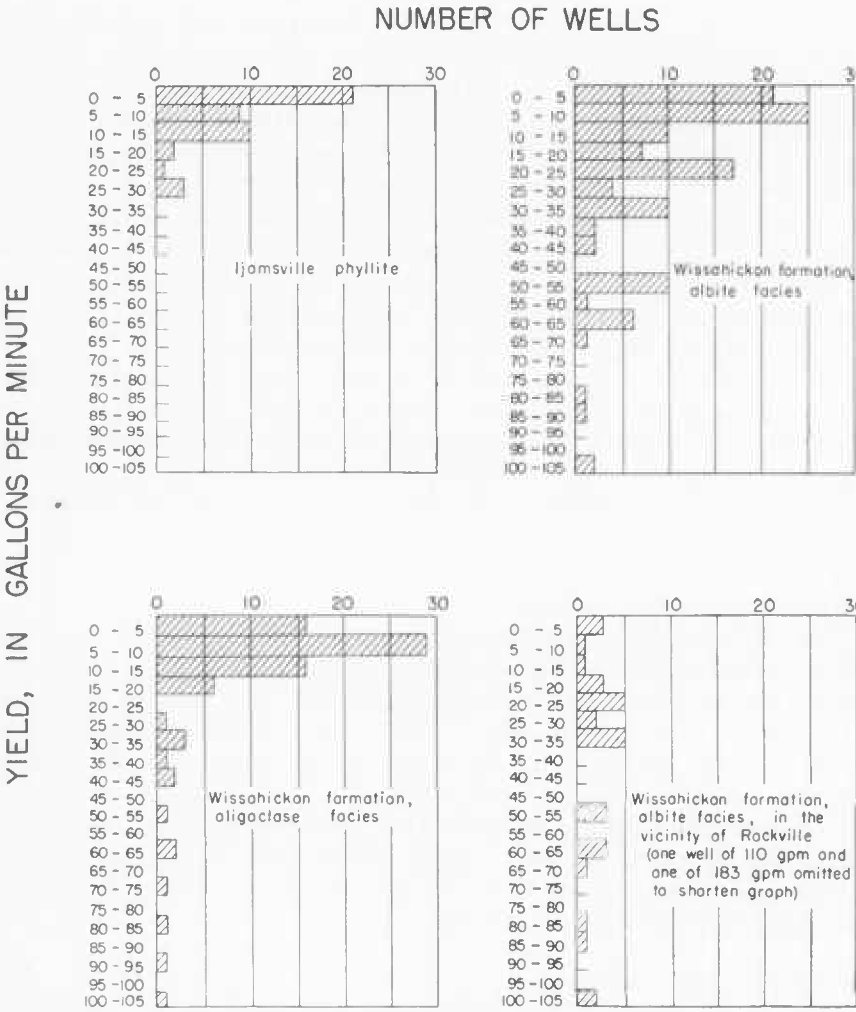

FIGURE 4. Graphs Showing the Frequency Distribution of Yields of Wells in the Wissahickon Formation and the Ijamsville Phyllite

wells of low yield (fig. 4), the Ijamsville phyllite is one of the poorest aquifers, if not the poorest, in Howard and Montgomery Counties. Reports of "dry holes" are fairly common in areas underlain by this formation, but water supplies adequate for domestic use generally can be obtained.

The yields of wells in the gabbro range from 1.5 to 40 gallons per minute, and most of the yields are 5 to 10 gallons per minute. A part of the gabbro in Howard County is capped by Cretaceous and Pleistocene sedimentary rocks

(Pls. 3 and 4). The average yield of 18 wells that penetrated the sedimentary deposits and terminated in the gabbro is 8.5 gallons per minute, and the average yield of 22 wells drilled in the gabbro in areas where there are no sedimentary deposits is 12.3 gallons per minute. This difference in average yield suggests that, in general, higher yields may be obtained in the gabbro areas not overlain by sedimentary deposits.

The oligoclase facies of the Wissahickon formation is one of the best aquifers in Howard and Montgomery Counties. The average yield of 80 wells is 14 gallons per minute, and the yields range from 2 to 100 gallons per minute; most of the yields range from 5 to 9 gallons per minute (fig. 4). About 15 percent of the wells have yields of 25 gallons or more per minute.

The average yield of 128 wells in the albite facies* of the Wissahickon formation is 24 gallons per minute. This figure would be considerably less, perhaps on the order of the average yield of the oligoclase facies, were it not for the large number of municipal and industrial wells in the area underlain by this unit, which are pumped harder than are domestic wells. Moreover, most of these industrial and municipal wells are in the vicinity of Rockville, and local geologic factors—more intense fracturing, greater weathering, etc.—may in part explain the higher yields in that area.

Contact zones between intrusive rocks and the host rocks are frequently characterized by shearing, baking, and fracturing. The greater capacity of wells in and near the contact zones indicates that the rocks there are more permeable. The average yield of seven wells in contact zones is 32 gallons per minute, a higher average yield than for any of the geologic units except the Harpers phyllite, for which only two records of well yields were obtained.

The average yield for wells in the Cockeysville marble is relatively high, 25 gallons per minute. This high average yield is to be expected, for marble is much more soluble than the other crystalline rocks and the fracture openings are more readily enlarged by circulating water.

Relation of yield to depth of wells

The yield of wells in the crystalline rocks is not directly proportional to the depth of the wells because the permeability of the rocks is not uniform. Each additional increment of depth does not cause a corresponding increase in the yield of a well. Figure 5 shows graphically the data in Table 9, which is an analysis of yield versus depth for 397 wells. The relation of the yield to depth is probably true only in a general way, as the depth of a well in the crystalline rocks does not necessarily indicate the depth from which water was obtained. Three general types of fracture patterns from which wells in the crystalline

* The term albite facies is used to include all Wissahickon areas not underlain by the oligoclase facies.

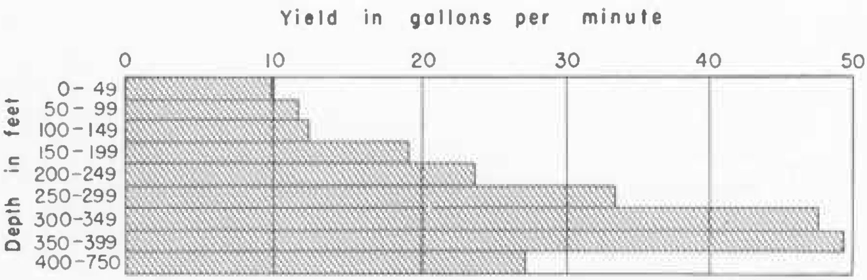

FIGURE 5. Graph Showing the Relation of Yield of Wells to Depth

rocks may produce water are illustrated schematically in figure 6, although wells usually produce water from a combination of these idealized types. Well A derives water from a group of closely spaced fractures just below the casing and near the upper surface of the relatively unweathered rock. Well B derives water from the one large fracture penetrated near the bottom of the well. Well C derives water from a number of small and equally spaced fractures throughout the uncased part of the well. If the wells are pumped so that the water level is drawn down to the bottom of the casing, the yields of the wells might be the same. However, if the water level is drawn down below the casing of the wells, the yields would not be the same. Well A produces its maximum yield when the water level is in the contributing zone, just below the bottom of the casing; further lowering of the pumping level in this well would not increase the yield. The yield of well B will increase with the lowering of the pumping level until the contributing fracture near the bottom of the well is reached. The increase in yield of this well for each additional foot of drawdown is nearly constant, in contrast with well A in which increased drawdown below

TABLE 9

Yield of Wells in Crystalline Rocks by Depth Intervals

Range in depth, in feet	Number of wells	Average depth, in feet	Yield, in gallons per minute			Percent of wells yielding 1 gallon per minute or less
			Range	Average	Per foot of well	
0– 49	29	38	0 – 35	10	0.26	3.4
50– 99	173	75	1 – 71	12	.16	1.2
100–149	113	126	0.5– 75	14	.11	2.5
150–199	26	164	0.5– 60	19	.12	0.0
200–249	14	219	1 – 80	24	.10	7.1
250–299	16	273	1 –183	36	.13	6.2
300–349	13	305	5 –100	48	.16	0.0
350–399	5	366	4 –100	49	.13	0.0
400–750	8	468	0.2–120	27	.06	25.0

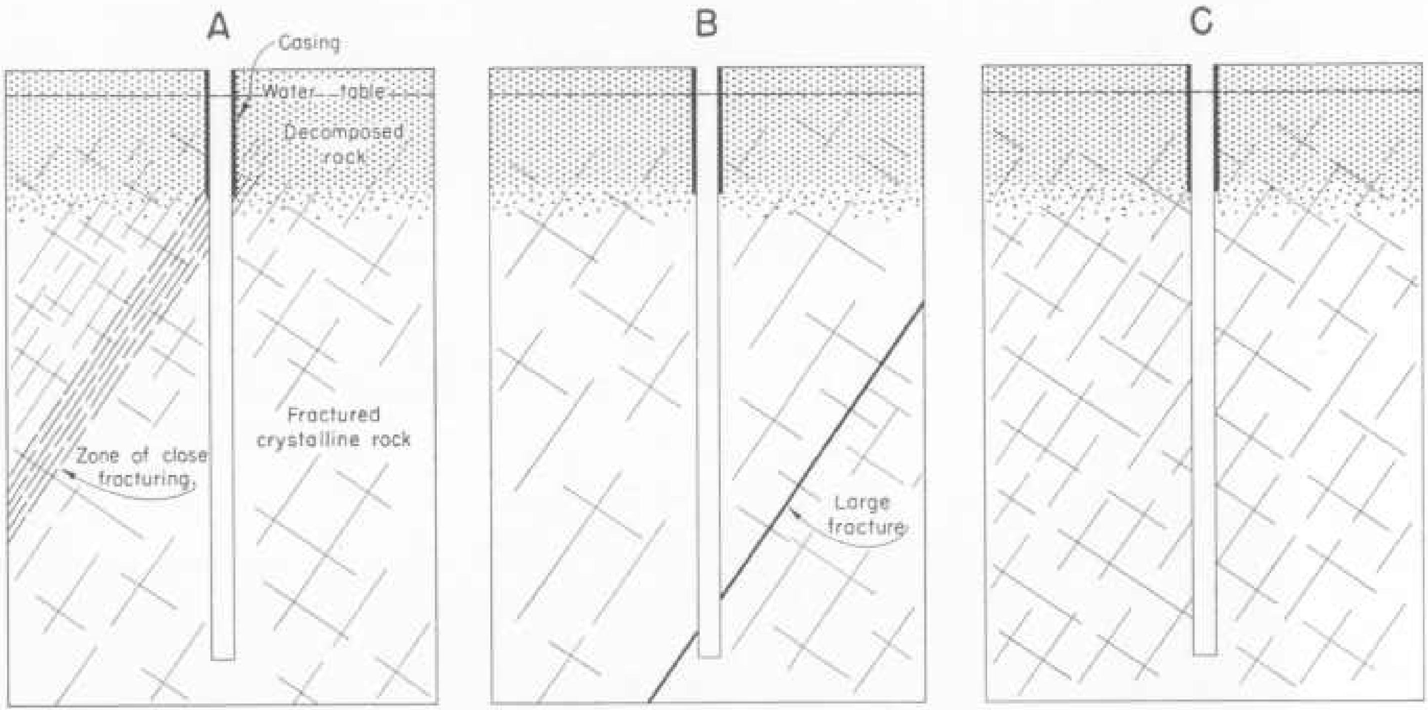

FIGURE 6. Schematic Diagrams Showing Three Types of Fracture Patterns from which Wells in Crystalline Rocks Produce Water

the contributing zone near the top of the well resulted in no further increase in yield. In well C, as in well B, the yield increases with increasing drawdown; however, the rate of increase of the yield may be somewhat less than in well B because of the reduction in transmissibility as the lowering of the pumping level reduces the thickness of the saturated section of the rock.

Occasionally the well drillers' reports contain sufficient information to identify the well as similar to one of the types illustrated in figure 6. Well How-De 15 is similar to type A, as this well was reported to obtain all its water at depths between 60 and 70 feet, with no measurable increase in yield when the well was continued to a depth of 375 feet. Well Mont-Fe 2 is typical of type B in that the well was reported to obtain practically all its water from the lowest 2½ feet of the well. Well Mont-Ef 41 was tested at three depths while being drilled, and the yield increased substantially at each successively lower depth. This well may obtain its water from a number of contributing fractures and probably is similar to type C.

Although some of the wells in the crystalline rocks may be exclusively one of these three types, most of the wells are probably of a combination type. They produce from more than one fracture or set of fractures, and the producing zones may occur at various depths or may be as widely separated as the top and bottom of the uncased section of the well. In many wells one fracture or zone of fractures may contribute most of the water, while minor amounts are contributed by other fractures.

Table 9 and figure 5 indicate that in general there is a considerable increase in yield of wells with increasing depth. However, below 350 feet there is little increase in yield. The yield of wells more than 400 feet deep averages less than the yield of wells between 250 and 400 feet. As the wells in the crystalline rocks are generally uncased below the top of the hard rock, the yield of a well represents the yield from fractures in the entire section of rock penetrated by the well. Therefore, the yield of wells should continue to increase with depth. The reversal of this trend indicated for the wells more than 400 feet deep is due in part to insufficient sampling and in part to the fact that wells more than 400 feet deep are probably drilled in areas where the permeability of the shallow rocks is unusually low. Wells are seldom drilled to depths of 400 feet or more unless it is impossible to obtain an adequate water supply at shallower depths.

Relation of yield of wells to topographic position

Topographic position of wells is one of the most important factors affecting the yield in the crystalline rocks. Table 10 and figure 7B show the relation between yield and the topographic position of crystalline-rock wells in Howard and Montgomery Counties. The wells are classified as being in one of the following topographic positions: upland flat, hilltop, hillside, valley side, valley, valley flat, and draw (fig. 7A). With respect to yield, the poorest topo-

TABLE 10

Depth and Yield of Wells by Topographic Position

Topographic position	Number of wells	Depth, in feet				Yield, in gallons per minute				Average yield per foot of well
		Range	Average	Median	Mode	Range	Average	Median	Mode	
Hilltop	113	25–400	114	90	100	0.2–100	10	8	10	0.09
Hillside	166	18–750	123	100	100	0.0–110	16	10	10	.13
Valley	28	22–295	120.5	100	100	1 –183	34	20	60	.28
Valley side	22	27–412	110	80	70	2 – 60	14	10	10	.12
Valley flat	11	38–402	187	170	—	2 –110	30	10	—	.16
Upland flat	51	38–395	116	100	100	2 – 87	19	12	10	.18
Draw	9	62–350	124	85	—	3 – 50	15	15	—	.12

graphic position for a well is on a hilltop (average yield 10 gallons per minute), and the best locations are in a valley (average yield 34 gallons per minute) or on a valley flat (average yield 30 gallons per minute). The median yield and modal yield* are more representative than the average yield, as they are less affected by extremes. The median yield of 8 gallons per minute for wells on hilltops and of 20 gallons per minute for wells in valleys further emphasizes the difference between the yields of wells in the two types of topographic position. This difference is more strikingly shown by the modal yield of 60 gallons per minute for wells in valleys as compared with 10 gallons per minute for wells on hilltops.

A low average yield for wells on hilltops and high average yield for wells in valleys has been reported in the Piedmont of North Carolina (Mundorff, 1948, pp. 30–31, and LeGrand and Mundorff, 1952, pp. 16–19). They considered the higher yields of wells in valleys to be due chiefly to a greater permeability of rocks beneath valleys. The higher yields of wells in valleys and valley flats may be due also in part to the shallower water table in the valleys, which permits greater drawdown than for wells of the same depth on hills.

The wells on hillsides, valley sides, and in draws have average yields that are similar, approximately 14 gallons per minute, but the average yield for wells on undissected upland flats, 19 gallons per minute, is somewhat greater, probably because of the shallower water table in these upland areas and the greater depth of weathering there.

Relation of yield of wells to depth of weathering

The weathered rock mantle forms a porous water-bearing zone that may contribute water to wells even though the casing extends through the weathered

* The median is the middle yield when the yields are arranged according to their magnitude; the modal yield is the most frequent or typical yield.

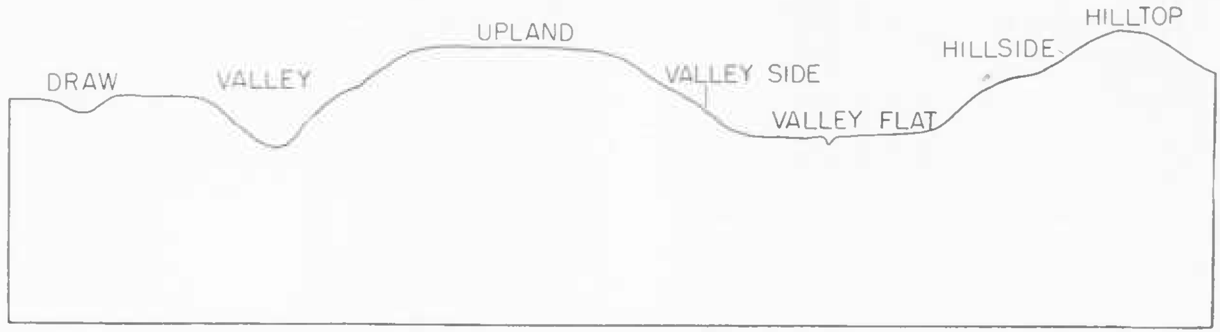

FIGURE 7A. Profile Diagram Showing Topographic Features by which Wells were Classified for Statistical Analysis of Yields

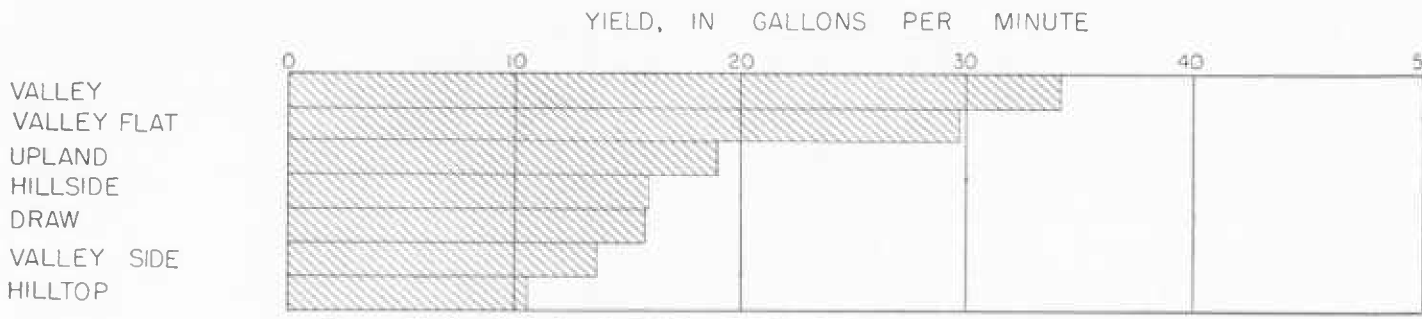

FIGURE 7B. Graph Showing the Relation of Yield of Wells to Topographic Position

TABLE 11

Average Yield of Wells by Depth of Weathering (Length of Casing)

Depth of weathering, in feet	Number of wells	Average depth of weathering, in feet	Average yield, in gallons per minute	Range in yield, gallons per min.
0– 24	53	16	15	0.5–183
25– 49	102	35	16	.5–120
50– 74	63	60	20	2 –100
75– 99	33	81	22	2.5–100
100–200	10	126	20	1 – 80

material. The length of casing of wells in the crystalline rocks may be used as a reasonably accurate measure of the thickness of the decomposed rock as well drillers usually seat the casing on, or just into, the hard rock. According to Table 11, there is a small but fairly consistent increase in average yield with increased depth of weathering up to about 100 feet; with greater thickness of weathering there is no increase in average yield.

Water-Bearing Properties of the Weathered Rock Mantle

The crystalline rocks are mantled by a considerable thickness of clay-rich residual material resulting from the weathering of the rocks. The thickness of the weathered and decomposed material ranges from a few feet to 100 feet or more and depends chiefly upon the rock type, topography, and degree of fracturing. In general, the decomposed or weathered rock is the thickest beneath rolling uplands and hills and thinnest beneath lowland areas (Table 12).

Mundorff (1948, p. 31) suggests that most valleys and draws are localized by zones of structural weakness (greater fracturing, shear zones, etc.) in the underlying bedrock. It would seem to follow that weathering by solution would proceed more rapidly in the valleys and therefore the weathered rock mantle there should be thicker. However, the data in Table 12 show that the thickness of the weathered rock is greater beneath hills, hillsides, and upland flats than

TABLE 12

Average Depth of Weathering by Topographic Position (as Indicated by Length of Casing in Wells)

Topographic position	Number of wells	Average length of casing, in feet
Upland flat	25	50
Hillside	138	48
Hilltop	75	48
Draw	7	39
Valley side	18	34
Valley	12	32
Valley flat	6	20

beneath draws, valleys, valley flats, and valley sides. If there is more rapid weathering by solution of the rocks in zones of weakness beneath the valleys, erosion in the valleys is sufficiently rapid to prevent the accumulation of a great thickness of weathered material. Some of the freshest and hardest rock in the Piedmont is exposed in the steep-walled, V-shaped valleys cut by many of the streams.

Some of the hills and ridges, like the ridge of Ijamsville phyllite between Damascus and Ridgeville, are supported by masses of resistant rock. The rock underlying these hills and ridges may be exposed at or near the crest of the hill or may be only a few feet beneath the surface. The Damascus-Ridgeville ridge is underlain by phyllite at such a shallow depth that most of the wells on this ridge are either uncased or use one length of clay tile as casing.

The permeability of most of the decomposed rock is probably low as the material consists of a heterogeneous mixture of clay, quartz grains, mica flakes, and occasional boulders of relatively unweathered rock. Most of the dug wells in the crystalline-rock area are completed in the weathered material above the hard rock. None of the dug wells in Howard and Montgomery Counties are reported to have large yields. The average yield of most of the dug wells in the decomposed rock is probably less than 5 gallons per minute.

The large diameter of dug wells (generally 3 to 4 feet) provides a large storage space for water, so that water may be withdrawn for short periods at a rate much higher than the aquifer is capable of yielding to the well. A well 3 feet in diameter contains 53 gallons of water per foot, and a well 4 feet in diameter contains 94 gallons per foot. Thus, a dug well that is 3 feet in diameter and contains 10 feet of water would have an available supply of 530 gallons in addition to the water that would flow into the well from the aquifer. For this reason, a dug well yielding as little as half a gallon per minute may be satisfactory as a domestic water supply. However, as dug wells penetrate only a short distance below the water table, their yields decline during periods of no rainfall, and they may even "go dry."

A short pumping test was run on a dug well (How-Bf 22), 1 mile southwest of Ellicott City, which is 48 inches in diameter and 15.7 feet deep (fig. 8). This well is dug in gabbro that has been weathered to a sandy clay. The drawdown of the water level after pumping at the rate of 4 gallons per minute for 90 minutes was 3.05 feet. The apparent specific capacity for this short period of pumping is 1.3 gallons per minute per foot of drawdown, which is much higher than the specific capacity would be if there were not a large quantity of water stored in the well. The total quantity of water pumped from the well during the test was 360 gallons; of this total approximately 287 gallons was withdrawn from storage in the well and 73 gallons was obtained from inflow from the aquifer. The average rate of inflow was approximately 0.8 gallon per minute. After pumping was stopped, the rate of recovery of the water level showed

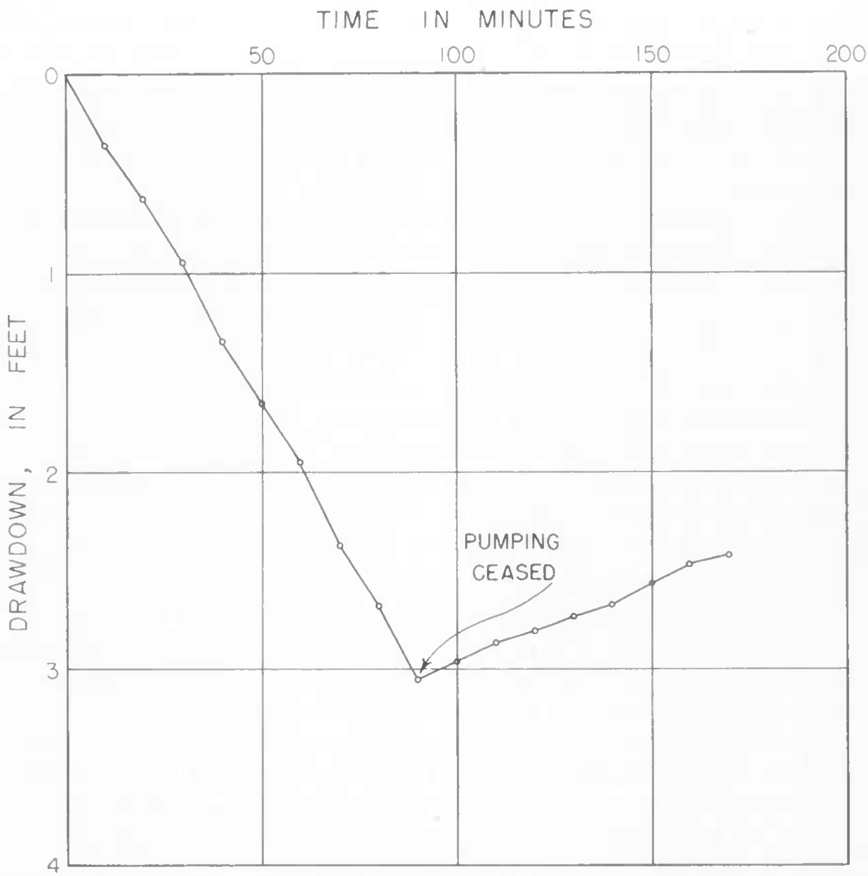

FIGURE 8. Graph Showing the Drawdown and Recovery of Water Level in a Large-Diameter Dug Well, near Ellicott City

that the average rate of inflow from the aquifer continued to average about 0.8 gallon a minute. It would appear, then, that the true specific capacity of this well for longer periods of pumping is approximately 0.25 gallon per minute per foot of drawdown.

Recharge, Movement, and Discharge of Ground Water in the Crystalline Rocks

Recharge

Recharge to the crystalline-rock ground-water reservoirs in Howard and Montgomery Counties is derived almost entirely from local precipitation. The average annual precipitation in Howard and Montgomery Counties is about 41 inches, but the percentage of this precipitation that recharges the ground-water reservoirs is relatively small and not uniformly distributed. Although other factors are involved, the permeability of the soil, subsoil, and bedrock, the vegetation, the topography, the duration and intensity of precipitation, and the evaporation and transpiration largely determine the quantity of recharge to the ground-water reservoirs.

Records of water-level fluctuations in wells are helpful in understanding the nature of the occurrence of ground-water and the manner of recharge. The fluctuations in nine observation wells in Howard and Montgomery Counties are described on pages 45 to 49 and are shown graphically in figure 13 and 14. Simply stated, each rise in water level represents a period when the rate of recharge is in excess of discharge, and each decline a period when recharge, if any is occurring, is less than discharge. However, other factors may cause minor fluctuations of water level. A complete analysis of the significance of the water-level fluctuations has not been made.

The record of fluctuations in well Mont-Eg 1 is especially valuable because the record covers a period of 21 years. This well, which penetrates 20 feet into weathered material of the Wissahickon formation, is near Colesville, on a slope at an elevation approximately 30 feet above the Northwest Branch of the Anacostia River, and approximately 800 feet east of the river. Figure 14 shows the fluctuations of the water level in this well and the monthly rainfall from 1932 to 1953; figure 9 shows the average monthly water level and precipitation for the whole period.

The relation between precipitation and the water-level fluctuations in well Mont-Eg 1 is not simple and direct, for factors other than precipitation are involved in the fluctuations of the water level in the well. If the effects of evaporation and transpiration could be eliminated, it is likely that the curves in figures 9 and 14 would correlate more closely. During summer months the water level continues to decline in spite of the fact that precipitation is high. In general, recharge from precipitation is greatest in the winter and early spring months and least in the summer and early fall months, although in months in which precipitation is far above normal, such as September 1934 and July 1945 (precipitation graph in fig. 14), recharge to the ground-water reservoir is appreciable.

Seasonal changes in the frequency and duration of rainfall are important to the quantity of recharge to the ground-water reservoirs. Gentle rains extending over periods of days occur often in the winter and early spring in Howard and Montgomery Counties, and much water percolates into the ground and becomes ground water. Thundershower, or deluge-type rains, common in the summer, deposit water at the land surface at a rate much faster than it can be absorbed by the soil. The excess of water flows off the ground as surface runoff. Summer rains must also replenish soil moisture lost by evaporation and transpiration before recharge to the underlying ground-water reservoir can take place. In

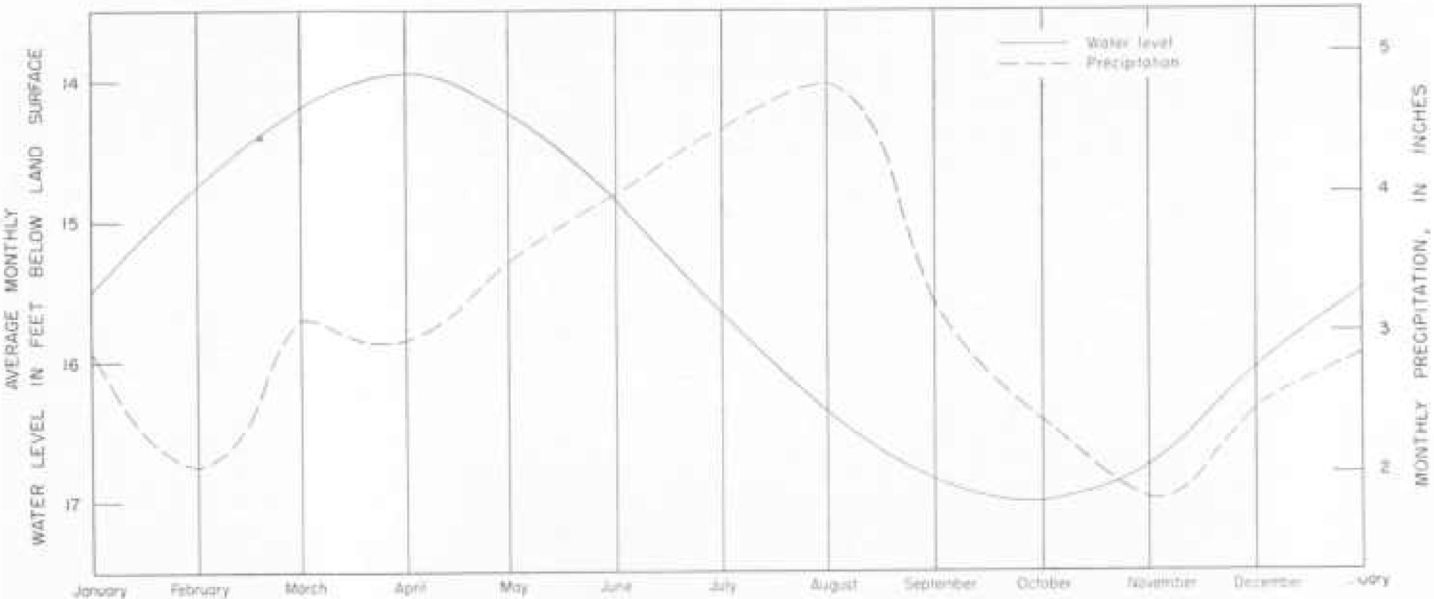

FIGURE 9. Graphs Showing the Average Monthly Water Level in Well Mont-Eg 1, near Colesville, and the Average Monthly Precipitation from 1932 to 1953

the winter, rain and snow and the low rates of evaporation and transpiration maintain soil moisture, and a large part of the precipitation may recharge the ground-water reservoirs, once the summertime deficiency in soil moisture is made up.

Figure 9 compares the average monthly water level in well Mont-Eg 1 and the average monthly precipitation at Laurel (Prince Georges County) from 1932 to 1953. Although the precipitation is highest in the summer, the water level trends downward showing that the rate of recharge at that time is relatively low; in the winter months, although the precipitation is lower, the water level trends upward. The average monthly water-level curve is similar to a sine curve, reaching a maximum in April and a minimum in October. The months in which the water-level curve trends downward, May through October, constitute the growing season in Montgomery County, and the remaining months, during which the curve is upward, are months of plant dormancy. Although for short periods recharge may be more or may be less than discharge, over long intervals a balance is established between the two.

Movement

The movement of ground water in the crystalline rocks conforms in a general way to the pattern of movement described for water-table conditions in the unconsolidated sedimentary rocks (pp. 16–18 and fig. 2), in that the water moves downward and laterally from the interstream areas of recharge to the valleys which are areas of discharge. However, this general pattern of movement is greatly modified by the variations in permeability of the crystalline rocks and by the associated weathered rock mantle and the sedimentary deposits which in places overlie them. Since the movement of water in the unweathered rocks is confined largely to fracture openings, the water may follow devious and angular paths before being discharged. The pattern of flow is complicated also by the characteristic decrease in permeability of the crystalline rocks with depth. Most of the circulation takes place in the upper few hundred feet where the fractures and other openings are larger. Where the weathered material or sedimentary deposits are more permeable than the underlying crystalline rocks, the greatest circulation takes place above the unweathered rock. Under this condition water moves downward and laterally toward streams, but predominantly laterally for the less permeable unweathered rock retards downward movement. Where the weathered material or sedimentary deposits are less permeable than the underlying crystalline rocks, a greater part of the circulation may take place in fracture openings in the rock. A perched water table can develop in the overlying material under these conditions, if the water in the crystalline rock is discharged at a rate faster than the overlying less permeable material can replenish or recharge it. Drillers report that during the drilling of some wells the water level lowered when the wells penetrated a deeper permeable zone. This may indicate that perched water conditions occur there; however, the water level may lower because the head in the deeper water-bearing zone is lower than that in a shallower zone.

Discharge

Ground water is discharged from the crystalline-rock reservoirs by seepage or spring flow into streams, by evaporation and transpiration, by subsurface movement into neighboring areas, and by pumping wells.

A certain amount of discharge takes place by subsurface movement out of the area, but the discharge by this means is a very small percentage of the total, and doubtless is approximately compensated for by movement into the area.

Evaporation and transpiration affect both the quantity of water received by the ground-water reservoirs and that discharged from them. A large amount of water from precipitation is lost by evaporation and transpiration of the water without ever reaching the ground-water reservoirs. Some water is discharged in the same way after it reaches the ground-water reservoirs, particularly in stream valleys where the water table is close to the land surface and vegetation is dense. Determination of the quantity or rate of evaporation and transpiration involves elaborate investigation with measurement of many climatic, hydrologic, and botanic factors. An approximation of the total evaporation and transpiration, which includes evaporation and transpiration from the soil zone and zone of aeration, from the ground-water reservoir and from surface water exposed to the atmosphere, can be made by subtracting stream flow from precipitation.

The gaging station on Rock Creek, in Rock Creek Park, in Washington, D. C., measures continuously the total runoff from about 62.2 square miles of area underlain by crystalline rocks, chiefly the Wissahickon formation. With the exception of a small area in the District of Columbia, the Rock Creek basin is entirely within Montgomery County. The basin has a rolling topography, is well drained by tributary streams, and is fairly representative of the average small Piedmont drainage basin. The average annual precipitation in this basin for the 17-year period 1933–49, based on measurements at Takoma Park and Germantown, was about 43.5 inches, and the average yearly runoff of Rock Creek was the equivalent of about 12.6 inches. The difference between these values, 30.9 inches, represents approximately the average annual losses by evaporation and transpiration. Thus, of the total precipitation upon the area, about 71 percent is lost by evaporation and transpiration. This loss is about 2.5 times as much as the average total runoff. The monthly average total runoff and precipitation for the 17-year period were computed to determine the approximate seasonal fluctuation in the rate of evaporation and transpiration. These data are given in Table 13 and shown graphically in figure 10.

TABLE 13

Mean Monthly Precipitation and Total Runoff, and Estimated Ground-Water Runoff and Loss by Evaporation and Transpiration in Rock Creek Basin, Montgomery County, for the Period 1933–49

Month	Mean monthly precipitation (inches)	Evaporation and transpiration[a]		Total runoff		Ground-water runoff		
		Inches	Percent of precipitation	Inches	Percent of precipitation	Inches	Percent of precipitation	Percent of total runoff
January	3.57	2.16	61	1.41	39	0.93	26	66
February	2.67	1.21	45	1.46	55	.97	36	66
March	3.22	1.65	51	1.57	49	1.20	37	76
April	3.18	1.68	53	1.50	47	1.07	34	71
May	4.24	3.00	71	1.24	29	.93	22	75
June	3.83	3.02	79	0.81	21	.59	15	73
July	4.42	3.68	83	.74	17	.46	10	62
August	4.66	3.86	83	.80	17	.37	8	46
September	4.14	3.58	86	.56	14	.34	8	61
October	3.60	2.90	81	.70	19	.43	12	61
November	3.01	2.17	72	.84	28	.54	18	64
December	2.93	1.95	67	.98	33	.69	24	70
Annual average of 17 - yr. period 1933–49	43.5	30.9	71	12.6	29	8.5	20	67

[a] Precipitation minus total runoff; figures include one percent or less of discharge by pumping.

Losses by evaporation and transpiration are greatest in the summer and early fall months, with a maximum equivalent to about 86 percent of precipitation in September, and least in the winter months, with a minimum of about 45 percent in February.

A part of the total runoff of streams is water discharged from the ground-water reservoirs. The "base flow" of streams is maintained by ground-water runoff. A graph of the stream-flow record for Rock Creek (fig. 11), shows sharp upward-pointing peaks which represent periods of high stream flow during and shortly after rainfall when direct surface runoff is high. When rainfall ceases, surface runoff decreases rapidly so that the flow of the stream declines rapidly. After a few days the stream flow is practically all from ground water. The dashed line beneath the total-runoff curve is the estimated part of the total runoff that consists of ground-water runoff, the water discharged from the ground-water reservoir within the basin. The curve was drawn by a method adapted from the procedures employed by Houk (1921) and Meinzer and Stearns (1929, pp. 107–116), and is subject to certain errors listed by Meinzer and Stearns (1929, p. 111). To illustrate the method employed, two years of the

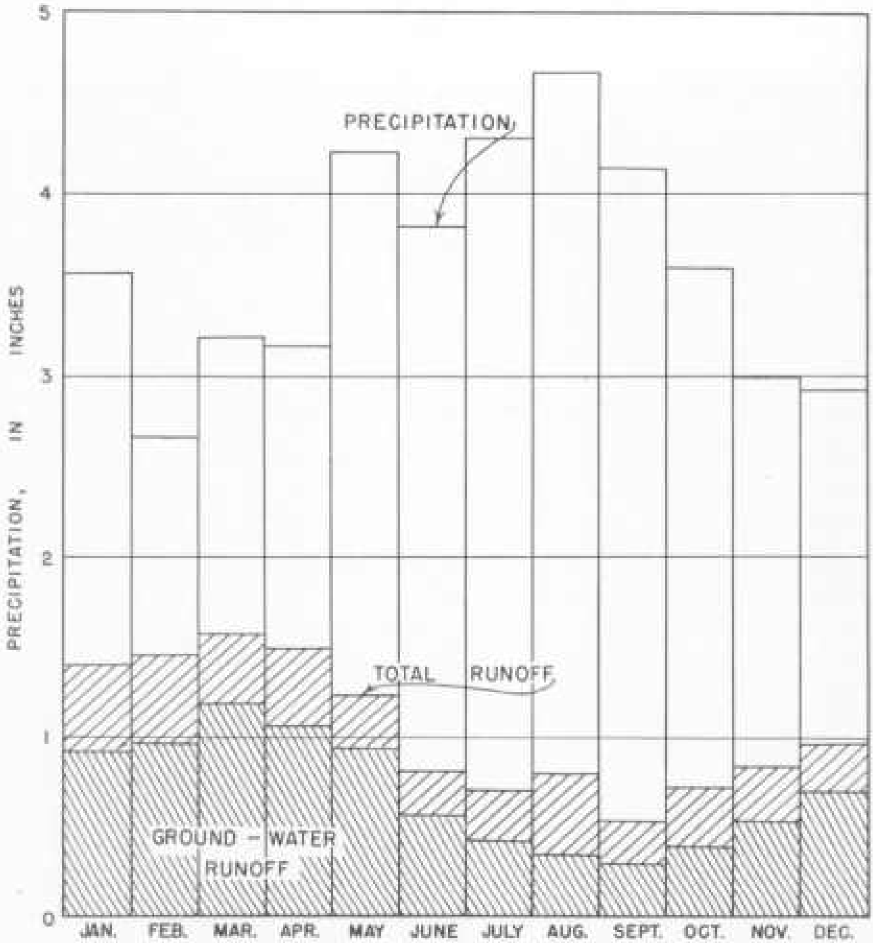

FIGURE 10. Graph Showing the Mean Monthly Precipitation, Total Runoff, and Estimated Ground-Water Runoff in the Rock Creek Basin, Montgomery County

stream-flow record are shown in figure 11. The ground-water runoff was determined by this means for the 17-year period 1933–49, and is given in summary form in Table 13 and figure 10. During the summer and early fall a period of active evaporation and transpiration, the water table generally is low and ground-water storage is reduced; during those times the discharge of ground water to the streams in the Rock Creek basin is small. During the remainder of the year, when losses by evaporation and transpiration are small, the water table is high, ground-water storage is greater, and the discharge of ground water to the streams is greater. This is shown in the monthly relation of ground-water runoff to total runoff and precipitation, in figure 10 and Table

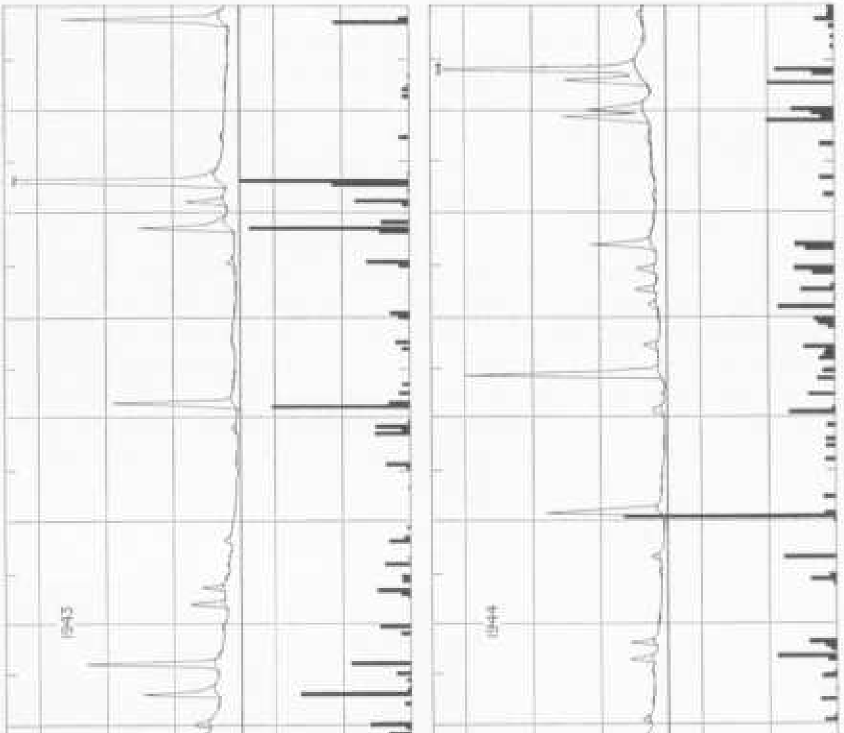

FIGURE 11. Graphs Showing the Discharge of Rock Creek, Estimated Ground-Water Runoff, and Precipitation, in 1943 and 1944

13. For the 17-year period 1933–49, 29 percent of the precipitation is stream runoff and 20 percent of the precipitation (67 percent of the runoff) is discharge from the ground-water reservoir. The total runoff for the 17-year period averages 0.6 million gallons a day per square mile of the Rock Creek basin, and the ground-water runoff approximately 0.4 million gallons a day per square mile. If these total-runoff and ground-water-runoff figures are applicable to all of Howard and Montgomery Counties, the average daily total runoff from the counties is roughly 450 million gallons, of which about 300 million gallons is ground-water runoff.

The ground-water runoff is not, however, equal to the ground-water recharge. Some of the recharge is discharged by evapo-transpiration, and some is pumped from wells. That portion is not discharged as ground-water runoff. Thus total ground-water recharge is greater than ground-water runoff. However, assuming that only a negligible amount of the ground water now discharged by evapo-transpiration could be salvaged by pumping from wells, and neglecting the effect of the present relatively slight pumping, it is reasonable to assume that the ground-water runoff into streams represents the maximum amount of ground water that could be recovered, and thus is equivalent to the effective recharge.

An average of about 4.5 million gallons of ground water is discharged daily from pumped wells in Howard and Montgomery Counties (pp. 43–45). Expressed as an areal average, about 6,000 gallons of ground water per square mile is withdrawn each day through wells, which is equivalent to only about 1½ percent of the natural ground-water discharge in streams. Locally, however, discharge from wells may constitute an appreciable percentage of the total ground-water discharge, as in the vicinity of Rockville.

In areas of concentrated ground-water development, analysis of stream-flow data may give clues to the potential quantity of ground water available for withdrawal. For example, approximately 0.75 million gallons per day of ground water is pumped from wells, in the vicinity of Rockville, which is partly within the Rock Creek basin. If the area of diversion caused by this pumping—that is, the area within which ground-water movement is toward the pumped wells—is assumed to be bounded by Rock Creek, Watts Branch, and Cabin John Creek, and tributaries of these streams, then this area of diversion is approximately 12 square miles. Under this assumption, the present pumping rate is equivalent to a withdrawal of 60,000 gallons a day per square mile. This pumping rate is about 15 percent of the average rate of ground-water runoff in the Rock Creek basin, and thus is also about 15 percent of the effective recharge.

If pumped wells were distributed evenly over the assumed 12 square miles of the area of diversion, then perennial pumping theoretically could be increased to about 5 million gallons a day. Of course, such a uniform distribution of pumping would require a very large number of wells spaced at short distances, and the development and operating costs doubtless would be excessive. Moreover, most of the streams would be dried up for long periods. Nevertheless, this theoretical potential yield of the ground-water reservoir in the Rockville area has value in indicating the maximum quantity of ground water it is possible to withdraw over long periods of time.

DEVELOPMENT AND UTILIZATION OF GROUND WATER

About 30 percent of the total pumpage of 4,500,000 gallons a day in Howard and Montgomery Counties is used for institutional or public supplies. About 75 percent of the population of Montgomery County is in the suburban areas of the District of Columbia and is served by the public water supply of the Washington Suburban Sanitary District. Prior to the formation of the Sanitary District in 1918, the towns bordering the District of Columbia were supplied by their own water-supply systems. The area served by the Sanitary District has been extended from time to time to include additional populated areas in Montgomery County, and many wells in the newly annexed areas have been abandoned. Practically all the present ground-water pumpage in Montgomery County is in the area outside the Sanitary District, and in this area very little surface water is utilized.

At present Rockville, in Montgomery County, has the only major ground-water public supply. Gaithersburg, also in Montgomery County, abandoned its ground-water public supply a few years ago for a supply from the Washington Suburban Sanitary District. The Gaithersburg and Rockville well fields are described briefly below.

Gaithersburg (1950 population: 1,755). The Gaithersburg public supply was put into operation in about 1924 by the Washington Suburban Sanitary District; the water from a commercial well near the center of the town was used. About 1927 the first well for the public-supply well field was drilled near Diamond Avenue in the western part of town. Additional wells were drilled from time to time to furnish additional water to meet increasing demands or to replace abandoned wells. By 1948, about 12 additional wells in the Diamond Avenue well field and about 4 wells in other parts of town had been drilled, all in the Wissahickon formation. Two wells were drilled to augment the supply, at Washington Grove, a short distance east of Gaithersburg, but the wells penetrated serpentine and were unsuccessful. All the wells drilled were either 6 or 8 inches in diameter; they ranged in depth from 19 to 309 feet. Their yields when drilled ranged from practically nothing to 60 gallons a minute. When tested in 1947, none of the six wells then in use yielded more than 26 gallons a minute. The wells in the Diamond Avenue well field are within a few hundred feet of each other, and when they are pumped the mutual interference between wells is large. The pumping levels were reported to be near the bottom of the wells just before the use of water was curtailed, indicating that the well field was being pumped to or beyond its capacity. At that time about 125,000 to 150,000 gallons of water a day was being pumped from the town wells.

The water mains of the Washington Suburban Sanitary District were extended to Gaithersburg in 1949, since which time the ground-water supply has been used very little.

Rockville (1952 population: about 12,000). The municipal ground-water supply at Rockville was established about 1895, and since then more than 42 public-supply wells have been drilled, all within the city limits. Records of 42 wells drilled since 1922 are given in Table 2; approximately 27 are still in use. Practically all the wells are 8 inches in diameter; they were drilled to depths of 38 to 425 feet. Their reported yields range from practically nothing to 183 gallons per minute.

In the early part of the 20th century consumption of ground water in Rockville (fig. 12) was small, about 20,000 gallons a day or less; it increased to about 50,000 gallons a day during the First World War, and by 1930 reached about 100,000 gallons. Consumption rose to about 250,000 gallons daily during the Second World War and continued to rise during the postwar period. According to J. G. McDonald, City Engineer, an average of about 750,000 gallons of water a day was pumped in 1952, almost entirely for domestic use. The water is derived from the Wissahickon formation and probably also from contact zones between this rock and other rock types.

In Howard County the town of Elkridge is served by the surface-water supply of the Baltimore County Metropolitan District, and the water supplies of Ellicott City and Savage are obtained from nearby streams.

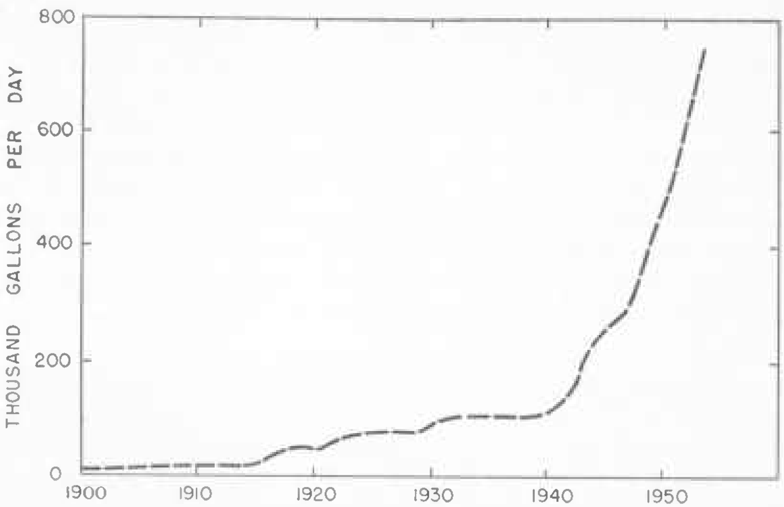

FIGURE 12. Graph Showing Pumpage of Ground Water from the Municipal Well Field at Rockville, Montgomery County, from 1900 to 1953

Several institutions, principally schools, use wells for water supplies. Some U. S. Government military installations and hospitals within the Washington Suburban Sanitary District are equipped with wells for use as auxiliary water supplies or for air conditioning.

Only about 10 percent of the total pumpage in the two counties is for industrial or commercial supplies. A cannery at Gaithersburg, which is reported to use about 300,000 to 400,000 gallons a day for a part of the year during the canning season, is perhaps the largest single commercial user. The total quantity of water utilized by the dairy industry of the area probably is large, although the consumption by any one dairy would be fairly small. Also, the commercial users of ground water, which consist of filling stations, drug stores, restaurants, and the like, individually use relatively small quantities of water, but the total consumption may be appreciable.

Most rural homes and farms in Howard and Montgomery Counties rely on individual wells for their water supplies, and concentrated suburban areas and rural housing projects are supplied by single wells or well fields. About 60 percent of the total pumpage is from wells drilled for domestic or agricultural purposes. Springs are much less important as sources of ground water for domestic supplies than are wells, but where good springs are available they are commonly used.

Very little water is used for irrigation or other agricultural purposes, but the large livestock population undoubtedly consumes an appreciable quantity of water. This water is obtained partly from streams and artificial ponds and partly from ground-water sources.

WATER-LEVEL FLUCTUATIONS IN OBSERVATION WELLS

Nine wells in Howard and Montgomery Counties (Table 14) were measured periodically to determine fluctuations of the water table. With the exception of a part of the record of well Mont-Ef 8, which was obtained from the municipality of Rockville, the records of the measurements in these wells are published in the annual water-level reports of the U. S. Geological Survey—Water-Supply Papers 817 (for 1936), 840, 845, 886, 907, 937, 945, 987, 1017, 1024, 1072, 1097, 1127, 1157, and 1166 (for 1950); reports for 1951 and 1952 are in preparation as Water-Supply Papers 1192 and 1222, respectively. The graphic records from seven of the wells are given in figures 13 and 14.

Water-level fluctuations in well Mont-Eg 1 have been measured since April 1932. A hydrograph of the record of fluctuations in this well is given in figure 14; the water level on the first day of each month was used to construct the graph. In general, the water level in this well is at an intermediate level at the beginning of a year, rises to its highest level in March or April, declines to a low level in September or October, and returns to an intermediate level at the end of the year. The graph indicates that a line joining points of mean annual water level

TABLE 14

List of Water-level Observation Wells in Howard and Montgomery Counties

Well number	Length of record (years)	Water-bearing formation	Topographic position	Location
How-Bd 1	6.5	Wissahickon (oligoclase facies)	Hillside	Slacks Corner
How-Bf 1	1.0	Do	Valley	One mile north of Ellicott City
Mont-Be 1	4.2	Ijamsville phyllite	Hillside	1.75 miles east of Damascus
Mont-Cf 1	4.2	Sykesville formation	Upland flat	Mount Zion
Mont-Dc 1	4.2	New Oxford formation	do	Dawsonville
Mont-De 1	5.2	Wissahickon (albite facies)	do	Gaithersburg
Mont-Ef 8	3.6	Do	do	Rockville
Mont-Ef 9	1.0	Do	Valley	Do.
Mont-Eg 1	20.7	Wissahickon (oligoclase facies)	Valley side	1.5 miles southwest of Colesville

would be in the shape of an arc, concave upwards, beginning with a water level of about 15.5 or 16.0 feet below the land surface in 1932–33, declining to the lowest mean annual water level of approximately 16.5 feet in 1941–42, and rising to 14.5 or 15 feet in 1952–53. The low average water levels in 1941 and 1942 resulted from consecutive deficiencies in precipitation for the years 1938 to 1941. The mean annual water level at the end of the record is roughly the same as at the beginning. Thus, the average quantity of ground water stored in the rocks in the vicinity of this well has not changed materially during the last 21 years. The extreme range in fluctuation of the water table during the 21-year record is 9.45 feet; the highest water level was 8.96 feet below the land surface on April 28, 1952, and the lowest, 18.41 feet on October 6, 1932.

The lengths of records of the other eight observation wells are relatively short. As wells How-Bf 1 and Mont-Ef 9 were measured for only one year, their records are inadequate to indicate characteristic fluctuations or long-term trends of water levels, and they are not shown in figure 13.

Wells Mont-Be 1, Dc 1, and Cf 1, measured for a little more than 4 years, show more or less typical seasonal fluctuations. During their periods of record there has been either no net change or a small rise in water level. Although factors such as agricultural development and delay in recharge due to frozen soil or to retention of precipitation in the form of snow may affect the position of the water table temporarily, abnormalities in the pattern of fluctuations generally can be explained by unusual fluctuations in rainfall, either in frequency or in quantity. Mont-Be 1, near Damascus, which has been measured for a

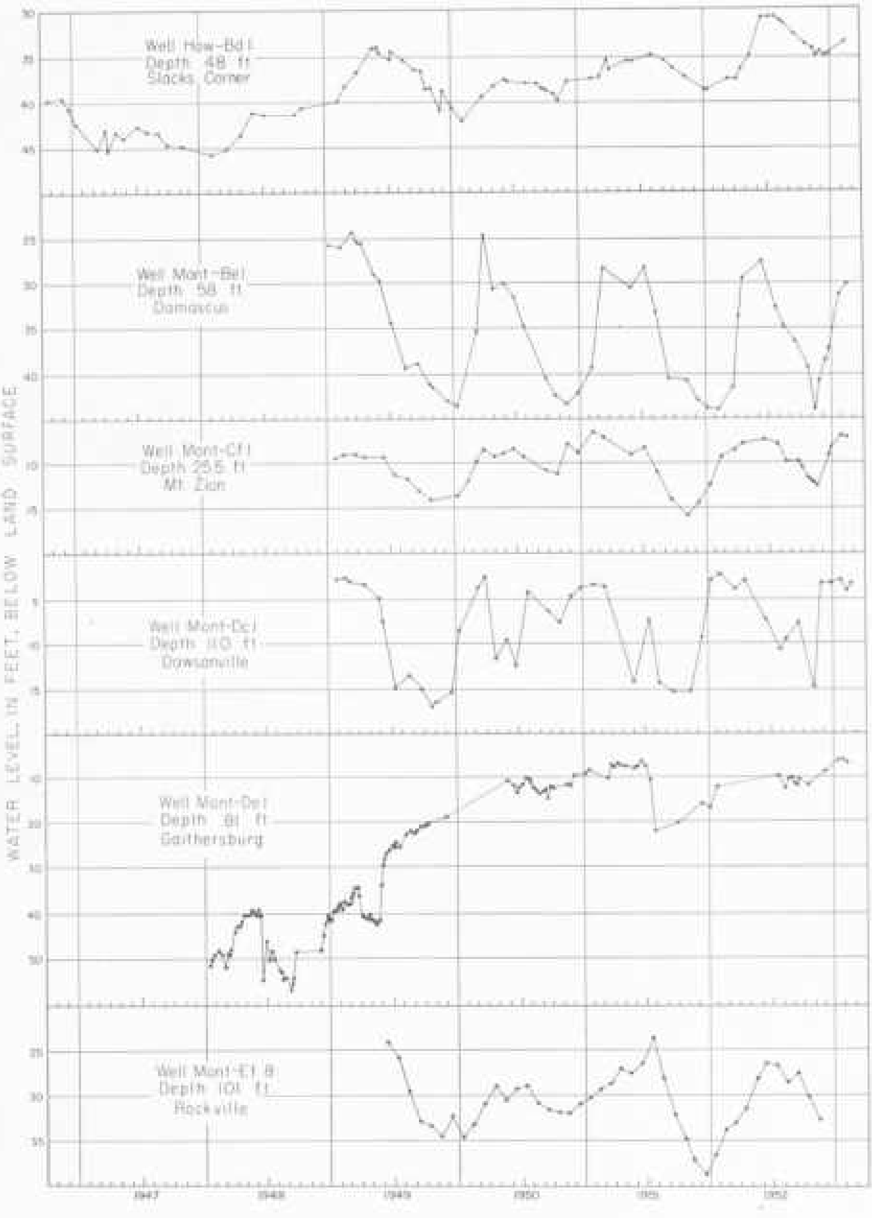

FIGURE 13. Hydrographs Showing the Fluctuations of Water Levels in Six Wells in Howard and Montgomery Counties

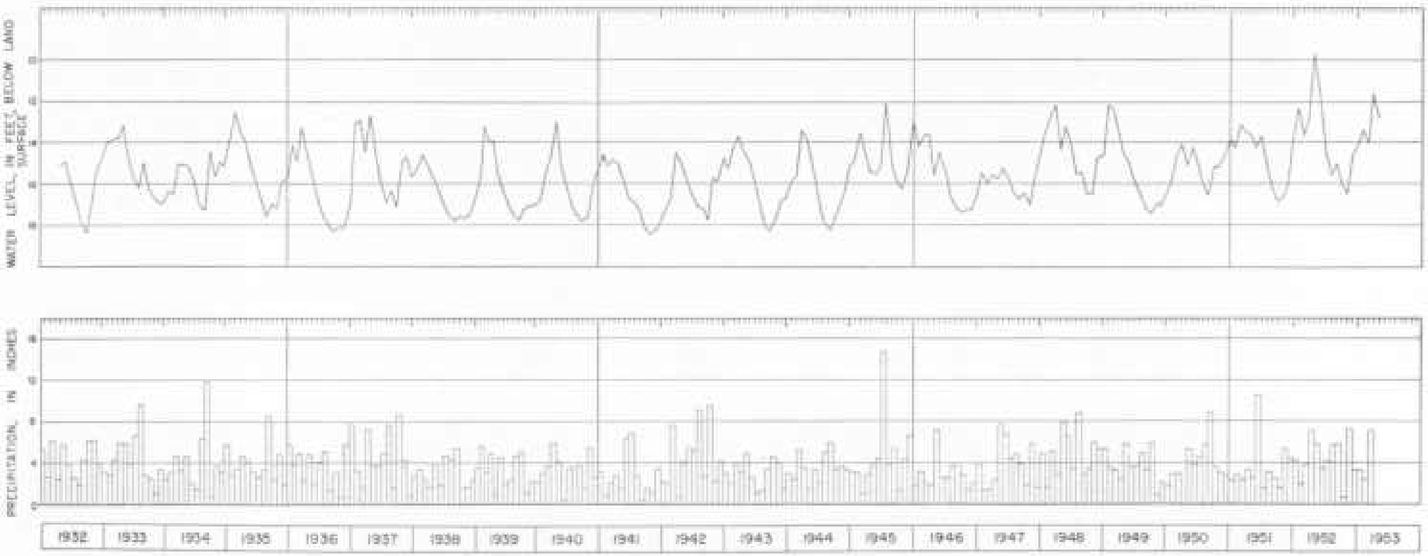

FIGURE 14. Hydrograph Showing the Fluctuations of Water Level in Well Mont-Eg 1, near Colesville, and Precipitation at College Park from 1932 to 1953

little more than 4 years, shows the largest seasonal fluctuation of any of the observation wells. The well is near the crest of a hill in an area of somewhat greater relief than the other observation wells and is drilled in the Ijamsville phyllite which in this area probably has a low capacity for storing ground water. The range between the high water level in the spring and the low water level in the fall generally is about 15 to 20 feet.

Well Mont-Ef 8 is in Rockville near pumped wells; hence, the fluctuations in this well are affected by artificial discharge. The record of fluctuations shows the highest water level occurring near the middle of each year and the lowest near the end of each year.

Well How-Bd 1, at Slacks Corner, has been measured for a little more than 6 years. Although this well is pumped for domestic use, it shows an over-all rise of the water level of approximately 10 feet during the period of record, perhaps reflecting the above-normal precipitation recorded for the last 5 years at the nearby Woodstock precipitation station. Seasonal water-level fluctuations in this well are partly obscured by the pumping.

Well Mont-De 1, near the center of the former public-supply well field at Gaithersburg, has been measured for 5 years. The record begins in 1948 when the annual withdrawal of water was the greatest in the history of the supply which was followed by essential abandonment of the supply in 1949. As a result, the water level in the well showed a recovery of about 35 feet. The fluctuations recorded in the latter part of 1950 and afterwards are a combination of natural fluctuations, fluctuations caused by pumping of nearby privately owned wells, and occasional pumping in the Gaithersburg well field.

WELL CONSTRUCTION AND SPRING IMPROVEMENT

The wells inventoried in Howard and Montgomery Counties are either dug or drilled. So far as could be determined no bored or jetted wells are in use in the area. A few driven wells may be in use for domestic water supplies on the low alluvial terraces along the Potomac River.

Many of the dug wells were constructed by excavating a pit about 3 to 4 feet in diameter. Large-diameter concrete casing was then lowered into the pit and digging continued inside the casing. As the well was deepened the casing settled and additional sections were added to the top. Bricks or concrete blocks are used to line some wells. The depth of wells dug in the unconsolidated sediments or in the decomposed bedrock usually is limited by the difficulty of digging after the water table is reached. Most of the dug wells, in the area underlain by the crystalline rocks, are finished in the weathered material above the bedrock. The depth of the dug wells inventoried ranges from 10 feet to 70 feet, and the diameter is from 3 feet to 5 feet. One exception is a very old and large dug well (How-Bf 33) in Ellicott City reported to be 25 feet in diameter and 75 feet deep.

Most of the wells inventoried in Howard and Montgomery Counties are drilled wells, which range in diameter from 6 to 10 inches and in depth from 20 to 750 feet. They were drilled by the percussion (cable-tool) method, which consists of drilling by repeated blows of a heavy blunt steel bit. The drill bit is attached to several heavy steel weights and this "string of tools" is in turn attached to a cable. The drill bit is alternately raised several feet and then dropped, this cycle being repeated every few seconds, and the blows of the drilling tools crush the rock and mix it with water to form a thick sludge. After drilling for a short time the sludge is removed from the hole with a bail or sand bucket. In the weathered rock mantle the rate of drilling generally is 30 feet or more a day. The unweathered rocks are much harder and the normal rate of drilling is about 5 to 10 feet. In a few localities where the rock is very hard drillers report the rate of drilling to be as little as 6 inches a day.

In practically all the wells drilled in the crystalline-rock area the casing extends through the weathered rock mantle and far enough into rock to make a watertight seal. Seating the casing in this manner reduces the possibility of contamination from surface drainage and also prevents silt and clay of the weathered rock from entering the well.

Springs are used as a source of water for a number of homes and farms in some areas in Howard and Montgomery Counties, particularly in and near the larger stream valleys. Practically all the springs that are in use are improved to some extent. In most cases the improvement consists merely of cleaning off debris that has collected in the orifices of the spring and covering the spring with a small stone or concrete enclosure.

QUALITY OF GROUND WATER

The chemical character of the ground water in Howard and Montgomery Counties is shown by the range in concentration of dissolved mineral constituents in Table 15 and by the 69 chemical analyses in Tables 16 and 17. Water samples from 33 wells or springs were analyzed in the Water Resources Laboratory of the U. S. Geological Survey, 33 analyses were obtained from the files of the Maryland State Department of Health, and 3 analyses were obtained from other sources.

RELATION OF CHEMICAL CHARACTER TO CIRCULATION OF GROUND WATER

The dissolved gases and mineral salts in ground water in Howard and Montgomery Counties include those obtained from the atmosphere as the water falls as precipitation and those dissolved from the rocks as the ground water circulates through them. The chemical character of the water is not uniform throughout the area because of variations in the rate and pattern of circulation of the ground water and in the chemical composition of the rocks.

The relation between ground-water circulation and its chemical character

TABLE 15

Range in Dissolved Solids, Hardness, and Iron in Ground Water in Howard and Montgomery Counties

(In parts per million)

Water-bearing formation	Dissolved solids				Hardness as $CaCO_3$				Iron (Fe)			
	No. of analyses	Maximum	Minimum	Average	No. of analyses	Maximum	Minimum	Average	No. of analyses	Maximum	Minimum	Average
Crystalline rocks												
Wissahickon formation (albite facies)	30[a]	184	28	95	34[a]	96	2	34	29[a]	6.8	0.00	0.61
Wissahickon formation (oligoclase facies)	7[b]	159	25	64	7[b]	101	5	29	7[b]	3.6	.10	.81
Ijamsville phyllite	3	232	39	115	4[c]	85	11	44	3	0.95	.03	.46
Sykesville formation	2	77	34	56	6	23	8	16	4	1.1	.04	.52
Ellicott City granite	2	184	116	150	2	93	40	67	2	1.6	1.6	1.6
Baltimore gneiss	1	—	—	62	1	—	—	13	1	—	—	.31
Gabbro	5	180	91	151	6	121	22	86	5	8.0	1.2	4.3
Cockeysville marble	1	—	—	166	2	260	134	197	2	.12	.10	.11
Serpentine	2	344	342	343	2	186	172	179	2	.0	.0	.0
Setters formation	1	—	—	54	1	—	—	15	1	—	—	.10
All crystalline rocks	54	344	25	107	65	260	2	47	56	8.0	.00	.92
Sedimentary rocks												
New Oxford formation	3	402	82	173	3	210	31	97	3	4.9	.04	1.75
Quaternary alluvium	1	—	—	327	1	—	—	262	1	—	—	4.8
All sedimentary rocks	4	402	82	227	4	262	31	138	4	4.9	.04	2.51

[a] Includes analysis for 1 well drilled in contact zone with Sykesville formation.

[b] Includes analyses for 2 wells drilled in contact zones with Cockeysville marble and pegmatite.

[c] Includes analysis for 1 well drilled in contact zone with New Oxford formation.

is complex, but the more slowly the ground water moves through the rocks the greater the opportunity to dissolve mineral matter from the rocks (or under some conditions to deposit it). In the crystalline rocks the zone of aeration generally is in the upper part of the weathered rock mantle, and movement of water through this zone is downward toward the water table. Below the water table, which normally is in either the lower part of the weathered rock or the upper part of the bedrock, ground water moves downward and laterally. Since the flow of ground water in the bedrock is restricted at depth, the downward movement is retarded, so that in general, ground water moves laterally from upland or interstream areas toward valleys or streams. As the rate of circulation of water is greatest at shallow depths, the mineral content of the water is likely to be less at shallow depths than at greater depths where the circulation is retarded.

Most of the wells from which samples of water were collected for chemical analysis draw water from thick sections of the rocks, so that the relation of circulation to mineralization is revealed only vaguely if at all by the analyses.

RELATION OF CHEMICAL CHARACTER TO ROCK TYPE

The chemical composition of the rocks in Howard and Montgomery Counties is not uniform. The quartz veins are composed principally of silica, the Cockeysville marble is chiefly calcium carbonate, and the granite, gneiss, and schist include both silica and other minerals of simple composition and complex silicates. Hence, the chemical character of the ground water, which to some degree reflects the chemical character of the rocks, is likewise not uniform.

The solubilities of the rocks also are not uniform. The carbonate rocks are relatively soluble, whereas the quartzose rocks are relatively insoluble. The principal basic radicals (cations) in the analyses in Tables 16 and 17 are sodium and calcium, and the principal acid radicals (anions) are sulfate and bicarbonate, although some of the analyses show a predominance of other constituents. Most of the samples may be classed as of the calcium sulfate or calcium bicarbonate type.

The principal cations of 26 complete analyses of water from 11 rock types are plotted in figure 15 against the principal anions in percent of reacting values to show the predominant types of water in the rocks. This form of presentation of chemical analyses of ground water is adapted from the method presented by Langelier and Ludwig (1942). All but two of the analyses are to the right of the vertical center line which indicates that the predominant cations are calcium and magnesium, and all the analyses are widely distributed above and below the horizontal center line, indicating a wide range in sulfate, chloride or nitrate, and bicarbonate. Most of the analyses in the upper right block are higher in sulfate than in chloride or nitrate. In some analyses part of the nitrate or chloride content is due probably to contamination by surface seepage.

TABLE 16

Chemical Analyses of Ground Water in Howard County

[In parts per million, except pH and specific conductance]

Well No.	Water-bearing formation	Date of collection	Dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Phosphate (PO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Manganese (Mn)	Aluminum (Al)	Zinc (Zn)	Copper (Cu)	Hardness as $CaCO_3$		Carbon Dioxide (CO_2)	pH	Specific conductance ($K \times 10^6$ at 25°C.)	Analyst
																					Total	Non-Carbonate				
Ab 2	Ijamsville phyllite (?)	May 15, 1952	39	6.9	0.41	1.9	1.6	2.9	0.9	7	0	1.0	0.0	3.5	0.1	8.0	0.04	0.1	0.5	0.00	11	6	36	5.5	47.3	A
Bc 8	Sykesville	Dec. 17, 1952	77	29	1.1	5.4	2.3	9.6	1.8	22	0	12	.0	9.0	.0	4.3	.01	.2	.08	.02	23	5	28	6.1	101	A
Bd 3	Cockeysville marble	May 15, 1952	166	15	.12	45	5.3	2.0	2.6	145	0	17	.0	3.0	.1	1.3	.00	.0	—	.00	134	15	3.6	7.8	263	A
Bd 4	Baltimore gneiss	do	62	26	.31	3.4	1.0	4.9	1.2	37	0	0.8	.2	2.5	.1	1.1	.01	1.2	5.5	.00	13	0	14	6.6	64.9	A
Bd 9	Sykesville	Dec. 16, 1952	34	15	.48	1.8	0.6	2.7	.9	12	0	1.6	.0	1.0	.0	3.7	.01	.3	.84	.07	8	0	9.6	6.3	34.2	A
Bd 14	Cockeysville marble	July 7, 1952	758(?)	12	.10	74	3.1	—	—	—	.0	9.1	—	28	.05	6.0	.0	.5	—	—	260	—	—	7.2	—	B
Bd 15	Cockeysville marble-Wissahickon (oligo.)	do	62	14	.10	5.6	.9	—	—	—	.0	1.0	—	5.6	.05	0.0	.0	.51	—	—	50	—	—	6.2	—	B
Bf 4	Ellicott City granite	Mar. 21, 1951	184	39	1.6	27	6.2	9.5	1.4	93	0	32	—	5.2	.0	7.5	.00	.9	—	—	93	17	37	6.6	258	A
Bf 35[a]	Setters	Feb. 2, 1951	54	14	.10	0.07	3.2	—	—	—	.0	.7	—	8.7	—	1.6	.0	.5—	—	—	15	—	—	6.0	—	B
Cc 1	Wissahickon (oligoclase)	Dec. 19, 1952	66	15	.43	6.7	1.5	10	1.5	18	0	1.0	.0	17	.0	8.0	.05	.0	.59	.01	23	8	23	6.1	113	A
Cf 1	Gabbro	Jan. 18, 1950	180	32	3.2	27	2.1	—	—	—	.0	31	—	9.7	—	.1	.15	2.0	—	—	99	—	—	6.4	—	B
Cf 2	Do	Jan. 19, 1950	170	43	4.0	19	2.0	—	—	—	.0	2.3	—	5.1	—	.2	.70	.5	—	—	85	—	—	6.8	—	B
Cf 3	Do	May 5, 1949	142	29	8.0	9.5	5.6	—	—	—	.0	1.5	—	3.8	—	.2	.60	3.2	—	—	121	—	—	6.5	—	B
Cf 11	Do	Dec. 23, 1952	91	39	5.1	5.1	2.3	6.2	3.2	37	0	9.2	.0	1.0	.0	.3	.19	.0	1.7	.21	22	0	12	6.7	76.7	A
Cf 30	Ellicott City granite	July 22, 1952	116	31	1.6	.21	1.7	—	—	—	.0	11	—	5.4	.15	.0	.0	1.6	—	—	40	—	—	6.1	—	B
Cg 1	Gabbro	Apr. 26, 1944	—	—	—	—	—	—	—	112	7.9	20	—	5	—	.1	—	—	—	—	105	—	0.64	8.5	—	A
De 2	Do	May 23, 1952	172	21	1.2	16	10	15	1.5	20	0	59	.0	25	.1	2.2	.16	.3	.0	.42	81	65	80	5.6	259	A
De 16[b]	Wissahickon (oligo)—pegmatite	Feb. 5, 1953	25	9.6	.13	1.2	.5	2.2	.8	10	0	.2	.0	2.3	.1	.1	.01	.0	.42	.00	5	0	6.3	6.4	24.9	A

Analyst: A—U.S. Geological Survey.
B—Maryland State Health Dept.

[a] Composite sample of three springs at site.

[b] Barium (Ba) .0, Lithium (Li) .0.

TABLE 17

Chemical Analyses of Ground Water in Montgomery County

[In parts per million, except pH and specific conductance]

Well No.	Water-bearing formation	Date of collection	Dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Phosphate (PO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Manganese (Mn)	Aluminum (Al)	Zinc (Zn)	Copper (Cu)	Hardness as $CaCO_3$: Total	Hardness as $CaCO_3$: Non-Carbonate	Carbon Dioxide (CO_2)	pH	Specific conductance (K × 10⁶ at 25°C.)	Analyst
Be 7	Ijamsville phyllite	Mar. 8, 1951	75	5.3	0.03	5.4	4.5	6.8	1.6	12	0	3.2	—	9.6	0.0	30	0.00	0.5	—	—	32	22	6.0	6.5	133	A
Be 34	Do	May 22, 1952	232	6.1	.95	16	11	21	2.1	30	0	26	5.6	27	2.5	73	.09	2.5	8.0	0.00	85	61		6.2	299	A
Cb 1	New Oxford	do	96	9.1	4.9	12	4.6	4.2	1.3	21	0	29	0.0	8.5	.0	7.0	.05	.8	3.0	.00	49	32	33	6.0	149	A
Cd 15	Wissahickon (albite)	Dec. 17, 1952	59	13	1.6	4.5	0.9	4.1	1.2	38	0	5.6	.0	3.5	.0	3.3	.08	1.9	5.1	.09	15	0	30	6.3	71.3	A
Ce 13	Do	Oct. 12, 1946	—	—	—	—	—	—	—	60	—	1.0	—	4.0	—	3.9	—	—	9	—	38	—	—	6.3	—	A
Cf 9	Do	Dec. 16, 1952	84	16	.99	6.7	3.2	5.0	0.8	76	0	1.6	.0	5.0	.2	2.9	.08	3.1	10	.01	30	0	7.6	7.2	132	A
Cg 16	Sykesville	Nov. 11, 1947	—	—	.45	—	—	—	—	15	—	1	—	4.5	—	10	—	—	—	—	16	—	—	6.0	—	A
Cg 17	Do	May 25, 1948	—	—	.40[a]	—	—	—	—	20	—	2	—	2	—	6.2	—	—	—	—	18	—	—	5.9	—	A
Cg 18	Do	do	—	—	±.01[a]	—	—	—	—	14	—	4	—	2	—	3.5	—	—	—	—	15	—	—	6.0	—	A
Cg 19	Do	Nov. 11, 1947	—	—	.04	—	—	—	—	14	—	1	—	3.5	—	6.6	—	—	—	—	15	—	—	5.9	—	A
Da 1	Pleistocene and Recent deposits	May 16, 1952	327	0.2	4.8	82	14	5.6	.1	247	0	30	.0	7.4	0	37	.00	.0	0.2	.00	262	60	15	7.4	497	A
Db 1	New Oxford	May 22, 1952	402	25	.04	73	6.8	42	2.5	195	0	56	.2	48	.0	39	.01	1.5	5.5	.00	210	50	39	6.9	609	A
Dc 1	Do	Mar. 8, 1951	82	16	.31	8.8	2.1	6.6	.6	21	0	25	—	3.2	.1	4.3	.01	.8	—	—	31	13	8.4	6.6	117	A
Dc 3	New Oxford-Ijamsville phy.	Sept. 29, 1952	—	7.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	46.4	—	21[b]	6.7	—	C
De 2	Wissahickon (albite)	Mar. 8, 1951	184	21	.03	11	16	17	1.2	34	0	23	—	48	.1	15	.01	.1	—	—	93	65	54	6.0	303	A
De 20	Do	Mar. 27, 1951	100	23	1.2	4.4	3.1	—	—	—	0.0	4.1	—	9.2	—	3.0	.0	.0	—	—	30	—	—	6.1	—	B
De 24	Do	Aug. 31, 1948	148	—	.0	—	—	—	—	—	—	—	—	22	—	6.0	—	—	—	—	76	—	—	6.1	—	B
De 26	Do	do	110	—	.0	—	—	—	—	—	—	—	—	15	—	3.0	—	—	—	—	46	—	—	6.0	—	B
De 28	Do	do	104	—	.0	—	—	—	—	—	—	—	—	15	—	2.0	—	—	—	—	54	—	—	5.9	—	B
De 29	Do	do	58	—	.0	—	—	—	—	—	—	—	—	9.3	—	1.2	—	—	—	—	31	—	—	6.0	—	B
De 32	Do	June 23, 1948	110	—	.40	—	—	—	—	—	—	—	—	5.5	—	0.6	—	—	—	—	32	—	—	6.1	—	B
Df 4	Do	Mar. 27, 1951	58	13	.0	4.0	.13	—	—	—	.0	5.3	—	9.4	—	.6	.0	.5	—	—	26	—	—	6.1	—	B
Df 16	Do	Feb. 27, 1952	—	1.6	—	3.6	3.1	0	6.6	22	—	13	—	4.0	—	—	—	—	—	—	22.0	4	—	6.2	—	D
Df 23	Do	Mar. 27, 1951	80	15	.0	4.5	2.8	—	—	—	.0	.3	—	9.5	—	3.0	.0	.5	—	—	25	—	—	5.9	—	B
Dg 29	Wissahickon (oligoclase)	May 18, 1949	66	.6	.20	1.1	3.0	—	—	—	.0	2.0	—	5.8	—	.1	.01	1.0	—	—	9.0	—	—	6.7	—	B

Db 1	Do	Dec. 16, 1952	32	11	.28	1.3	1.1	2.5	1.1	10	0	1.6	.0	1.5	.2	4.6	.01	.3	.21	.10	8	0	16	6.0	35.5	A
Ed 1	Wissahickon (albite)	Dec. 17, 1952	63	21	1.1	5.4	.9	5.4	.7	28	0	1.8	.0	4.0	.2	7.2	.02	.5	33	.03	17	0	18	6.4	73.0	A
Ee 1	Do	Mar. 17, 1951	74	13	.0	5.2	2.5	—	—	—	.0	.5	—	6.0	—	.60	.01	.5	—	—	24	—	—	6.1	—	B
Ee 21	Do	Apr. 8, 1952	168	37	.11	17	12	6.4		64	0	45	—	4.3	.1	4.2	.00	.4	—	.35	92	39	16	6.8	231	A
Ee 23	Do	Mar. 27, 1951	104	11	.10	4.9	2.6	—	—	—	.0	.3	—	8.6	—	2.0	.0	.5—	—	—	31	—	5.9	—	—	B
Ee 25	Serpentine	Sept. 10, 1951	342	—	.0	—	—	—	—	—	—	—	—	11	—	.2	—	—	—	—	172	—	—	8.8	—	B
Ee 26	Do	do	344	—	.0	—	—	—	—	—	—	—	—	8.4	—	.4	—	—	—	—	186	—	—	8.7	—	B
Ef 1	Wissahickon (albite)	Mar. 27, 1951	122	26	.20	5.7	4.8	—	—	—	.0	14	—	10	—	1.4	.0	.0	—	—	38	—	—	6.1	—	B
Ef 2	Do	June 18, 1945	58	17	.16	2.0	1.5	—	—	—	.0	2.1	—	6.4	—	1.6	.01	1.1	—	—	21	—	—	6.0	—	B
Ef 5	Do	Mar. 27, 1951	146	14	1.0	9.1	3.8	—	—	—	.0	.5	—	22	—	5.0	.0	.5—	—	—	42	—	—	5.8	—	B
Ef 6	Do	Mar. 28, 1951	90	11	.0	4.0	4.5	—	—	—	.0	3.0	—	15	—	3.0	.0	.5—	—	—	28	—	—	5.8	—	B
Ef 7	Do	do	88	17	.20	8.2	3.3	—	—	—	.0	12	—	9.7	—	1.8	.0	.5—	—	—	32	—	—	5.8	—	B
Ef 10	Do	Dec. 27, 1946	47	19	.02[a]	1.8	3.0	5.0	.8	23	0	2.6	—	3.1	.1	2.0	—	—	—	—	17	—	1.8	7.3	5.64	A
Ef 11	Do	Oct. 22, 1941	40	—	—	—	—	—	—	—	—	—	—	3.4	—	.7	—	—	—	—	14	—	—	6.0	—	B
Ef 16	Do	Feb. 20, 1946	—	—	6.8	—	—	—	—	68	—	4	—	2	—	—	—	—	—	—	44	—	—	—	—	A
Ef 28	Do	May 18, 1949	92	29	.20	6.6	.07	—	—	—	.0	1.3	—	5.8	—	.4	.0	.5—	—	—	3	—	—	6.4	—	B
Ef 30	Wissahickon (albite)—Sykesville	do	190	98	1.0	0.5	4.6	—	—	—	.0	1.5	—	6.0	—	.1	.0	12	—	—	16	—	—	6.2	—	B
Ef 31	Wissahickon (albite)	Apr. 7, 1949	92	16	.1	3.8	.5	—	—	—	.0	1.3	—	4.1	—	.0	.0	1.5	—	—	17	—	—	6.3	—	B
Ef 36	Do	Mar. 27, 1951	92	9.0	.0	6.1	2.1	—	—	—	.0	1.3	—	12	—	3.0	.0	.5—	—	—	26	—	—	5.9	—	B
Ef 40	Do	Sept. 28, 1944	94	—	.04	—	—	—	—	—	—	—	—	10	—	5.0	—	—	—	—	29	—	—	5.7	—	B
Ef 46	Do	do	122	—	.04	—	—	—	—	—	—	—	—	25	—	5.0	—	—	—	—	38	—	—	5.8	—	B
Ef 50	Do	Nov. 8, 1949	28	7.1	.0	.14	.44	—	—	—	.0	1.0	—	2.7	—	.3	.0	.0	—	—	2	—	—	6.0	—	B
Eh 1	Wissahickon (oligoclase)	Dec. 23, 1952	37	8.1	3.6	1.4	.8	2.9	1.0	8	0	1.2	.0	3.2	.0	6.3	.00	.2	.80	.06	7	0	40	5.6	36.5	A
Fe 4	Wissachickon (albite)	Dec. 17, 1952	42	27	2.4	5.4	2.6	4.6	1.0	36	0	1.4	.0	2.0	.2	.8	.01	.0	.36	.03	24	0	18	6.5	65.5	A
Fe 6[c]	Do	May 1, 1942	—	—	—	—	—	—	—	—	—	—	—	3.5	—	.0	—	—	—	—	96	14	7.5	7.3	—	D
Ff 8	Wissahickon (oligoclase)	Oct. 26, 1948	158	29	.11	25	9.4	6.8		70	0	29	—	16	.1	6.8	—	—	—	—	101	44	17	6.8	249	A

Analyst: A—U. S. Geological Survey.
B—Maryland State Health Dept.
C—Oshkosh Pump and Filter Co.
D—Stone and Webster Engineering Corp.

[a] Iron in solution only.
[b] Free CO_2.
[c] Dissolved oxygen 3.4 ppm.

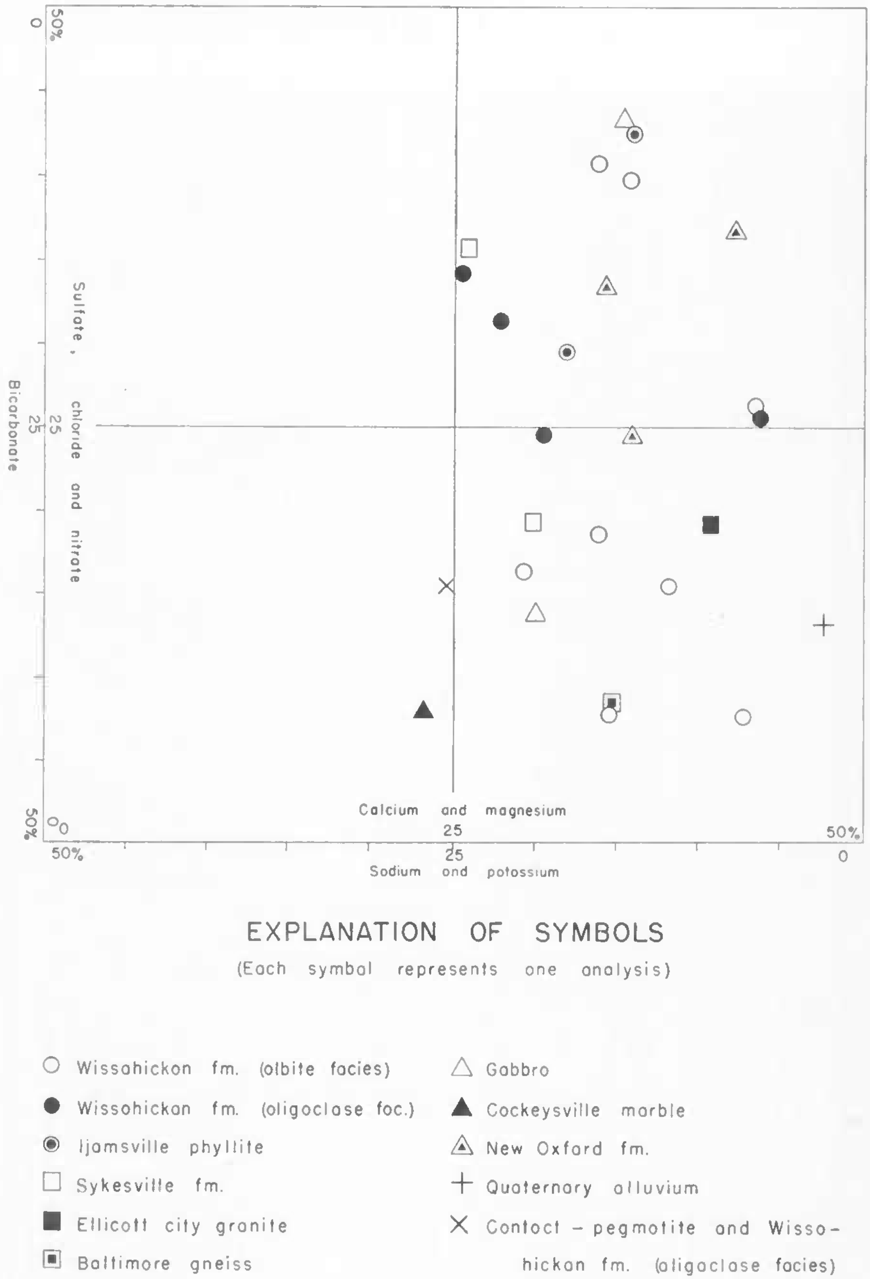

FIGURE 15. Diagram Showing the Chemical Character, by Percent Reacting Value, of Ground Water in Howard and Montgomery Counties

RELATION OF CHEMICAL CHARACTER TO USE

The chemical quality of ground water governs its suitability for certain uses. In this area dissolved solids, hardness, iron, hydrogen-ion concentration (pH), and carbon dioxide are generally the most important in the utilization of the ground water, although for some uses other properties or constituents may be more important.

Dissolved solids. The dissolved solids is the residue on complete evaporation of a water sample. It consists almost entirely of the mineral constituents reported in Tables 16 and 17. The residue may contain also minor quantities of other mineral constituents and small quantities of organic matter and water of crystallization. Water containing less than about 500 parts per million of dissolved solids is generally satisfactory for most uses. The dissolved solids in 58 samples of ground water in Howard and Montgomery Counties ranged from 25 to 402 parts per million; for one sample it was reported to be 758 parts, but this determination may be inaccurate.

The average of the dissolved-solids content in four samples from wells in the sedimentary rocks is 227 parts per million or about twice the average in samples from the crystalline rocks. This high average, however, is caused chiefly by the large content of calcium and magnesium bicarbonate in the samples from well Mont-Da 1, a shallow dug well in Quaternary alluvium, and Mont-Db 1, a drilled well in the New Oxford formation.

The dissolved-solids content in 54 water samples from wells in the crystalline rocks ranged from 25 to 344 parts per million and averaged 107 parts, excluding an analysis of one sample from the Cockeysville marble for which 758 parts per million was reported.

Hardness. The terms hardness and softness refer to the relative capacity of water to consume or precipitate soap. If mineral constituents causing hardness are present in water in relatively large quantities, the addition of soap to the water forms a sticky, insoluble curd. Excessive hardness of water is objectionable because the curd is difficult to remove from containers and fabrics, a greater quantity of soap is required to produce a lather, and a hard scale is deposited in steam boilers, water pipes, and cooking utensils.

The chief cause of hardness in the ground water of Howard and Montgomery Counties is the presence of relatively large quantities of calcium and magnesium. Other mineral constituents as iron, manganese, aluminum, barium, strontium, and free acid also cause hardness, although they generally are not found in large enough quantity to have appreciable effect. The hardness of the water as given in Tables 16 and 17 is divided into carbonate and noncarbonate hardness. Carbonate hardness (formerly designated "temporary" hardness) is the part of the hardness equivalent to the carbonate and bicarbonate ions. Carbonate hardness may be removed from water by application of heat or by evaporation. The noncarbonate hardness (formerly called "permanent" hardness) constitutes the remaining hardness and consists chiefly of calcium or magnesium sulfate or chloride. Both types of hardness have the objectionable properties described, but a harder scale is formed in steam boilers by "non-carbonate" hardness constituents.

Water having a hardness of about 50 parts per million or less is generally considered soft; water having hardness between about 50 and 150 parts is used for most purposes without treatment; hardness greater than this is noticeable to most users and softening is generally profitable to industries.

In Howard and Montgomery Counties the hardness of ground water, as indicated by 69 analyses, ranges from 2 to 262 parts per million. The hardness of water from four wells in the sedimentary rocks ranges from 31 to 262 parts per million; the hardness of water from the 65 wells or springs in the crystalline rocks ranges from 2 to 260 parts per million and averages 47 parts. The Cockeysville marble is composed in large part of hardness-forming minerals and the two analyses of water from wells in it show considerable hardness, the average of the two (197 ppm) being greater than the average for any other crystalline rock. The serpentine also yielded hard water, two samples averaging 179 parts per million. The hardness of the one sample from Quaternary alluvium is greater than that of the two samples from the Cockeysville marble, but probably more adequate sampling would show that the water in the Cockeysville marble is generally harder. Some of the other crystalline-rock formations contain isolated calcareous beds or zones, and within these beds or zones the water undoubtedly is hard.

Iron. In many parts of Howard and Montgomery Counties iron is present in the ground water in sufficient quantity to give the water a disagreeable taste and to stain sanitary fixtures, cooking utensils, and laundry. Iron, when in excess of about 0.3 part per million, will form a reddish-brown precipitate upon exposure to the air. Several relatively inexpensive water-treatment units are marketed which may be installed in water systems to reduce or eliminate the objectionable features of high iron content by preventing the precipitation of the iron. More expensive units remove iron from the water chemically or by aeration and filtration, or by combinations of these processes.

Analyses of water from 60 wells or springs in Howard and Montgomery Counties show the iron content to range from 0.0 to 8.0 parts per million and to average 0.9 part. The iron content in 27 analyses is higher than 0.3 part; 12 analyses show no iron.

Hydrogen-ion concentration (pH). The hydrogen-ion concentration (pH) is a measure of the alkalinity or acidity of water. Neutral water has a pH of 7; acid water has a pH of less than 7 and alkaline water more than 7. Water having a relatively low pH corrodes well casings, pumping equipment, and distribution systems, and water having a relatively high pH may deposit mineral matter. The pH in the 67 analyses of the ground water in Howard and

Montgomery Counties (Tables 16 and 17) ranges from 5.5 to 8.8. Only nine analyses show pH values higher than 7.0. The pH of a sample of ground water may change appreciably upon contact with the atmosphere; however, the pH figures in the tables are considered to be approximately the same as at the time of sampling, although they were determined days or weeks after the samples were collected.

Carbon dioxide. The carbon dioxide content of the ground water increases its solvent action or corrosiveness. Water having a low dissolved solids content and a pH of about 5 or 6 generally is high in carbon dioxide. Although no simple relation exists between corrosion potential and the quantity of carbon dioxide in the ground water, water having a carbon dioxide content in excess of about 10 parts per million is likely to be corrosive. The carbon dioxide content in the analyses in Tables 16 and 17 ranges from 0.6 to 80 parts per million. In nineteen of the analyses it exceeds 10 parts per million.

Minor constituents. Some minor constituents were determined in many of the analyses in Tables 16 and 17. Generally they are present in small quantities, but in places they may be present in sufficient quantity to be an important part of the chemical character of the water.

The content of the metallic elements copper, zinc, and aluminum, was determined in some of the samples. The copper content in 20 samples ranged from 0.00 to 0.42 part per million; eight samples contained no copper. The zinc content of 19 samples ranged from 0.00 to 10 parts per million; eight of the samples had a zinc content of 3 parts per million or more. The aluminum content in 47 samples ranged from 0.0 to 12 parts per million, and in 12 samples the aluminum content was 1.0 part per million or more. The copper and zinc, and perhaps aluminum in some of the samples may be higher than at their source because of the solvent action of the water on the well casing and pumping equipment.

The fluoride content in the samples was 0.2 part per million or less, except for a fluoride content of 2.5 parts in the sample from well Mont-Be 34.

Most of the samples contained no phosphate; in two samples it was 0.2 part per million, and in one, 5.6 parts.

TEMPERATURE OF THE GROUND WATER

The temperature of water from 20 wells and springs was measured (Tables 1 and 2). Nearly all the measurements were made after the wells had been pumped at least 15 minutes. A few measurements made at points in the distribution systems some distance from the wells are less accurate than temperatures measured at the wells. Measurements at 15 wells and 1 spring, which are considered to represent more accurately the temperature of the ground water before it is withdrawn, show a range in temperature of about 4 degrees. The lowest temperature, 51.7° F., was measured in the discharge of spring Mont-Cg

18 in December 1952, representing the temperature of the ground water at the water table at the time. The highest temperature, 55.5° F., was measured in well Mont-De 2 in March 1952; this well is 155 feet deep. The wells generally are cased for only a part of their total depth and the water pumped may be from various depths in the well; for this reason, and because the temperature of the water may change as it is being pumped from the well, the temperature measured at the land surface is only approximately the same as the temperature in the ground-water reservoir at depths equal to the bottom of the wells.

RECORDS OF WELLS

Descriptions of the wells inventoried in Howard County are given in Table 1 and in Montgomery County in Table 2. The locations of the wells are shown on Plates 1 and 2.

The altitude of the land surface at the wells was taken from topographic maps having either a 10-foot or a 20-foot contour interval.

"Type of well" refers to the method of construction. The wells that were drilled by the cable-tool percussion method are described as "drilled," and those that were dug manually or by some form of mechanical digger are described as "dug." A few wells drilled through the bottom of existing dug wells are described as "dug and drilled."

The well depths are reasonably accurate, except where approximate depths are indicated. Most of the depths were reported by well drillers; some were measured by the writers or reported by the well owners.

Wherever it was practicable, depths to water level were measured. The depths to water level in many wells were reported by drillers and well owners. Because many wells are not tested for their maximum capacity, many reported yields are less than the maximum rate at which the wells can be pumped.

TABLES 1–4

TABLE

Records of Wells in

Type of well: Dr, drilled.
Water level: Reported water levels are designated by "a".
Pumping equipment: *Method of lift:* B, bucket; C, cylinder; J, jet; N, none; Nl, pump to be installed; S, suction, T, turbine.
Type of power: E, electric motor; G, gasoline engine; H, hand; W, windmill.
Use of water: C, commercial; D, domestic; F, farming etc.; N, none; P, public supply; S, school or institution.
Remarks: Well logs and chemical analyses referred to are in Tables 3 and 16.

Well number (How-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Aa 1	Harry M. Snyder	E. Brown	1919	690	Dr	114	6	—	Valley	Ijamsville phyllite
Aa 2	U S. Government	do	1952	880	Dr	125	6	—	Hilltop	do
Aa 3	Do	do	1952	880	Dr	135	6		Hilltop	do
Aa 4	Do	do	1953	830	Dr	60±	6	—	Valley	do
Aa 5	Do	do	1953	840	Dr	60±	6	—	Valley	do
Aa 6	Do	do	1953	850	Dr	350±	6	—	Draw	do
Ab 1	Joseph Lettire	D. Brown	1949	680	Dr	60	6	50	Hillside	Ijamsville phyllite (?)
Ab 2	Ridgeville Nurseries	Easterday	1951	730	Dr	85	6	—	Draw on hillside	do
Ab 3	Fanny Young	E. Brown	1918	820	Dr	75	6	—	Hillside	do
Ac 1	William Wyatt	D. Brown	1951	610	Dr	81.2	6	0	Upland flat	Wissahickon (albite)
Ad 1	Howard Thomas	Edmondson	1948	470	Dr	50(?)	6	—	Hilltop	Sykesville
Ad 2	William L. Hawkins	do	—	470	Dr	43	6	—	Hillside	do
Ad 3	Robert E. Day	do	1912	460	Dr	80	6	—	Hilltop	do
Ad 4	Mr. Streaker	Lockhart	1915	560	Dr	56	6	—	Hilltop	do
Ad 5	Lee Warfield	—	1850±	600	Dug	32	96(?)	—	Hilltop	do
Ba 1	Robert Mullineaux	Easterday	1951	790	Dr	90	6	—	Hilltop	Ijamsville phyllite (?)
Bb 1	Mr. Poole	Easterday	1951	810	Dr	100	6	—	Hilltop	do
Bb 2	N. Warfield	E. Brown	1918	590	Dr	56	6	—	Hillside	Wissahickon (albite)
Bb 3	Raymond Duvall	—	1920	600	Dr	50	6	—	Upland flat	do
Bb 4	Albert Duvall	—	1920	560	Dr	50	6	—	Hilltop	do
Bb 5	David Clyde	E. Brown	1918	580	Dr	93	6	—	Hillside	do
Bc 1	Harry Eyere	Easterday	1951	570	Dr	106	6	0	Hilltop	Wissahickon (albite)
Bc 2	Edwin Waxfield	D. Brown	1948	580	Dr	102	6	95	Hilltop	do
Bc 3	William Brightwell	do	1948	500	Dr	86	6	10	Hilltop	do
Bc 4	Leo Butler	Smith	1950	450	Dr	115	6	20	Valley flat	Sykesville
Bc 5	Harry Rippeon	D. Brown	1949	580	Dr	82	6	70	Hilltop	Wissahickon (albite)
Bc 6	Frank O. Tremla	E. Brown	1952	600	Dr	25	6	0	Hilltop	Sykesville
Bc 7	Thomas G. Clark	D. Brown	1951	550	Dr	35.5	6	22	Hillside	do
Bc 8	Board of Education	E. Brown	1941	590	Dr	78	6	—	Upland flat	do
Bc 9	W. H. Wright	—	Old	580	Dug	28.1	48	—	Hilltop	do
Bc 10	Elisa Mathis	D. Brown	1945	540	Dr	43	6	—	Hillside	do
Bc 11	Herbert Mathis	Green	1950	440	Dr	62	6	—	Hilltop	do
Bc 12	F. M. Hearn	E. Brown	1936	460	Dr	65	6	—	Upland flat	Wissahickon (albite)

1
Howard County

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
15[a]	1952	—	3	—	—	—	C, E	D, F	—	Water-bearing zones reported at 15 and 60 ft.
—	—	—	1-2	1952	—	—	J, E	S	—	
—	—	—	1-2	1952	—	—	NI	S	—	
—	—	—	1±	1953	—	—	N	N	—	Drilled in weathered zone.
—	—	—	1±	1953	—	—	N	N	—	Do.
—	—	—	5±	1953	—	—	NI	S	—	
40[a]	May 10, 1949	—	3	—	—	—	J, E	D	—	See well log.
25[a]	May 31, 1951	50[a]	15	May 31, 1951	—	0.6	J, E	F	53.5	See chemical analysis.
—	—	—	8	—	—	—	C, E	D	—	Water reported soft
40.25	May 7, 1952	—	3	May 7, 1952	—	—	NI	D	—	
—	—	—	—	—	—	—	J(?), E	D	—	Water reported very hard.
20.58	July 23, 1952	—	6	—	—	—	J, E	D	—	
39.65	July 21, 1952	—	—	—	—	—	N	N	—	
18-20[a]	—	—	—	—	—	—	C, W	D, F	—	Supply reported to never fail; good quality.
—	—	—	—	—	—	—	J, E	D	—	Hard rock at about 3 ft.
20.42	May 6, 1952	—	8	Apr. 28, 1951	—	—	NI	D	—	See well log.
45.29	May 6, 1952	—	8	Mar. 20, 1951	—	—	C, H	D	—	See well log.
—	—	—	—	—	—	—	C, E	D, F	—	Water reported soft.
—	—	—	2	—	—	—	C, H	D	—	Water reported soft. Originally drilled for school.
—	—	—	2	—	—	—	C, H	D	—	Do.
30[a]	—	—	3	—	—	—	C, E	D, F	—	
70[a]	Apr. 18, 1951	—	5	Apr. 18, 1951	—	—	C, E	D	—	See well log.
70[a]	Nov. 10, 1948	—	3	Nov. 10, 1948	—	—	C, E	D	—	Do.
57.81	May 7, 1952	—	3	Oct. 21, 1948	—	—	C, E	D	—	
40[a]	Aug. 1950	—	—	—	—	—	N	N	—	Well destroyed; insufficient supply. See well log.
23.49	May 7, 1952	—	3	Dec. 10, 1949	—	—	J, E	D	—	
20.82	May 24, 1952	—	3(?)	May 24, 1952	—	—	S, H	D	—	
20.89	Aug. 29, 1952	—	5+	Aug. 29, 1952	—	—	J, E	D	—	Water reported soft.
15[a]	Sept. 52	—	12	1941	—	—	C, E	S	54	See chemical analysis.
14.51	Sept. 11, 1951	—	—	—	—	—	C, E	D	—	Well went dry in 1947. Water reported soft.
22[a]	1945	—	—	—	—	—	C, H	D	—	
20[a]	1950	—	—	—	—	—	C, E	D	—	Water reported soft.
12[a]	1952	—	—	—	—	—	C, E	D, F	—	Water reported slightly hard.

TABLE 1—

Well number (How-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Bd 1	S. D. Slack	—	1846	620	Dug	48	60	—	Hillside	Wissahickon (oligoclase)
Bd 2	Transcontinental Gas Pipeline Corp.	Ault	1950	360	Dr	202	6	15	Valley flat	Cockeysville marble
Bd 3	Do.	do	1950	360	Dr	203	6	16	Valley flat	do
Bd 4	Carroll Ireland	E. Brown	1950	540	Dr	173	6	58	Hillside	Baltimore gneiss
Bd 5	Earl Newcomer	do	1951	560	Dr	50	6	30	Hillside	Wissahickon (oligoclase)
Bd 6	C. O. Amoss	do	1946	520	Dr	68	6	32	Hillside	Sykesville
Bd 7	James Miles	do	1950	540	Dr	80	6	56	Hillside	Wissahickon (oligoclase)
Bd 8	J. M. Zoller, Jr.	do	1948	440	Dr	124	6	30	Hillside	Pegmatite
Bd 9	Catherine H. Anderson	J. B. Edmondson	1948	600	Dr	54.5	6	—	Upland flat	Sykesville
Bd 10	Stephen W. Ruth	do	1948	640	Dr	103	6	—	Upland flat	Wissahickon (oligoclase)
Bd 11	Ronulus Dorsey	D. Brown	1938	460	Dr	65	6	—	Valley side	do
Bd 12	Charles R. Garner	Randallstown Pump Works	1941	570	Dr	68	6	—	Hillside	Setters
Bd 13	Edward R. Frank, Sr.	J. B. Edmondson	1950	540	Dr	50	6	20	Upland flat	Baltimore gneiss
Bd 14	State of Maryland	—	—	370	Dr	110	6	—	Hillside	Cockeysville marble
Bd 15	Do	—	—	410	Spring	—	—	—	Valley	Cockeysville marble and Wissahickon (oligoclase)
Be 1	Mr. Hammond	—	—	350	Dug	13.5	60	—	Hillside	Wissahickon (oligoclase)
Be 2	Edgar A. Patterson	J. B. Edmondson	1949	450	Dr	55	6	30	Hilltop	Baltimore gneiss
Be 3	Melvin Blackburn	E. Brown	1946	460	Dr	140	6	25	Upland flat	Wissahickon (oligoclase)
Be 4	George Harbin	do	1948	440	Dr	78	6	45	Valley	do
Be 5	John David Engineering Corp.	do	1952	390	Dr	—	6	—	Hilltop	Ellicott City granite
Be 6	George Harbin	Dillon	1949	480	Dr	148	6	50	Hilltop	Wissahickon (oligoclase)
Be 7	F. E. Dance	Benson	1946	480	Dr	46.5	6	40	Hilltop	Baltimore gneiss
Be 8	Edward Dorsey	Easterday	1952	500	Dr	83	6	—	Hillside	Wissahickon (oligoclase)
Be 9	Thomas Powell	Reynolds	1946	400	Dug	18	10	—	Valley	Setters
Be 10	A. E. Meyers	—	1927	460	Dug	40	72	—	Valley side	Cockeysville marble
Be 11	C. W. Schek	—	before 1932	520	Dr	362	48-6	—	Hilltop	Wissahickon (oligoclase)
Be 12	H. D. Smith	—	1910	430	Dug	49	48	—	Valley side	Baltimore gneiss
Be 13	S. T. Stackhouse	—	1917	520	Dr	65	6	—	Valley flat	Cockeysville marble(?)
Be 14	Brice W. Henderson	E. Brown	1950	400	Dr	43	6	25	Valley side	Diabase (Triassic)
Be 15	Harvey S. Reed	Petticord	1941	420	Dug	30	72	—	Hilltop	do
Be 16	A. L. Shreve	Owings	1946	500	Dr	82	6	—	Hilltop	Baltimore gneiss
Be 17	Harry G. Thomas	E. Brown	1951	400	Dr	94	6	72	Valley side	Wissahickon (oligoclase)
Be 18	Doughoregan Manor	Schultz	1914	510	Dr	306	6	60	Hillside	Baltimore gneiss
Bf 1	Maryland Water Works Co.	Schultz	1916	290	Dr	127.6	8	—	Valley	Wissahickon (oligoclase)
Bf 2	Do	do	1916	290	Dr	200	8	—	Valley	do
Bf 3	Do	do	1917	300	Dr	300	8	—	Valley	do
Bf 4	Board of Education	Rogers	1950	300	Dr	28	6	28	Valley flat	Ellicott City granite
Bf 5	James Park	—	1948	400	Dr	65	6	—	Valley side	Gabbro
Bf 6	Earle M. Blankner	Rogers	1946	340	Dr	60	6	—	Hilltop	do
Bf 7	Harry Parlett	E. Brown	1946	450	Dr	69	6	—	Hilltop	Wissahickon (oligoclase)
Bf 8	Maryland National Guard	Harr	1950	390	Dr	106	6	—	Upland flat	Gabbro
Bf 9	Varsity, Inc.	E. Brown	1952	360	Dr	98	6	60	Hillside	Wissahickon (oligoclase)

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
40.03	Oct. 24, 1946	—	—	—	—	—	C, H	D, F	—	Water-level observation well.
18[a]	Aug. 1950	151[a]	40	Aug. 1950	20	0.3	T, E	C	—	Owner's well no. 2. See well log.
18[a]	Aug. 1950	151[a]	40	do	11	0.3	T, E	C	55	Owner's well no. 1. See well log and chemical analysis.
30[a]	1950	—	5	1950	—	—	C, E	D	53	See chemical analysis.
16[a]	Jan. 23, 1951	40[a]	5	Jan. 23, 1951	1	0.2	J, E	D	—	See well log.
40[a]	Dec. 3, 1946	48[a]	10	Dec. 3, 1946	1	1.2	J, E	D	—	
12.62	June 20, 1952	—	5	Jan. 16, 1950	—	—	J, E	D	—	Do.
60[a]	Dec. 10, 1948	90[a]	10	Dec. 10, 1948	1	0.3	J, E	D	—	Do.
36.21	July 23, 1952	—	20	Oct. 22, 1948	—	—	C, H	D	52	See chemical analysis.
50[a]	July 24, 1952	—	—	—	—	—	J, E	D	—	
—	—	—	—	—	—	—	C, E	D	—	Water obtained at 50 feet.
30.92	July 24, 1952	—	5	1941	—	—	J, E	D	—	
20[a]	Apr. 4, 1950	-	20	Apr. 4, 1950	0.5	—	J, E	D	—	Driller reported no drawdown when pumped at 20 g.p.m. See well log.
90[a]	1952	—	30[a]	—	—	—	C, E	D, F	—	See chemical analysis.
—	—	—	20	July, 1952	4	—	—	D, F	—	Do.
7.33	Jan. 12, 1950	—	—	—	—	—	S, E	D	—	Yield reported good
30[a]	Sept. 17, 1949	—	10	Sept. 17, 1949	—	—	S, H	D	—	See well log.
31[a]	Dec. 14, 1946	—	2	Dec. 14, 1946	—	—	C, E	D	—	Do.
35[a]	June 30, 1948	—	5	June 30, 1948	—	—	NI	D	—	Do
11.54	July 13, 1952	—	—	—	—	—	NI	D	—	
42[a]	July 12, 1952	—	0.5	Jan. 1, 1949	—	—	C, E	D	—	Do.
25[a]	Dec. 12, 1946	—	15	Dec. 12, 1946	—	—	C, E	D	—	Do.
27.42	July 24, 1952	—	—	—	—	—	NI	D	—	
7.84	July 24, 1952	—	—	—	—	—	J, E	D	—	Water reported soft.
36[a]	Mar. 1951	—	—	—	—	—	J, E	D, F	—	Lime deposits in hot water system.
22.61	July 24, 1952	—	—	—	—	—	J, E	D, F	—	
39[a]	July 1948	—	—	—	—	—	J, E	D	—	Hard water; high iron.
60[a]	1950	—	10	1917	—	—	C, E	D	—	
15[a]	Jan. 16, 1950	36[a]	4	Jan. 16, 1950	0.5	0.2	C, H	D	—	
8[a]	July 1952	—	—	—	—	—	J, E	D, F	—	
30[a]	Nov. 7, 1946	40[a]	20	Nov. 7, 1946	0.5	2.0	J, E	D	—	
55[a]	Oct. 30, 1951	68[a]	10	Oct. 30, 1951	2.0	.8	C, E	D	—	See well log.
10–15[a]	1914–18	—	22–26	1914–18	—	—	C, E	D, F	—	Water reported hard.
5.51	Oct. 25, 1946	—	5	1916	—	—	N	N	—	
—	—	—	40	1916	—	—	C, N	N	—	
—	—	187[a]	60	Sept 11, 1945	—	—	T, E	P	—	Pumping level, 1935.
9.61	Jan. 12, 1950	—	5	Jan. 15, 1950	—	—	C, H	S	—	See chemical analysis.
20.21	Jan. 12, 1950	—	—	—	—	—	J, E	D	—	
20[a]	Sep. 29, 1946	—	8	Sep. 29, 1946	—	—	J, E	D	—	See well log.
28[a]	Sep. 5, 1946	50[a]	15	Sep. 5, 1946	1.5	0.7	J, E	D	—	
9[a]	May 10, 1950	63[a]	10	May 10, 1950	18	0.2	T, E	S	—	
23[a]	Feb. 20, 1950	75[a]	10	Feb. 20, 1950	1	0.2	J, E	C	—	

TABLE 1—

Well number (How-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Bf 10	R. W. Devlin	E. Brown	1949	470	Dr	45	6	30	Hillside	Wissahickon (oligoclase)
Bf 11	Mrs. Grimm	do	1948	450	Dr	39	6	25	Hillside	do
Bf 12	Alvia Ramsburg	do	1950	440	Dr	68	6	25	Hillside	do
Bf 13	John C. Kuhn	—	1952	460	Dr	55.8	6	—	Upland flat	Baltimore gneiss
Bf 14	William Kerwin	—	Before 1900	470	Dug	25.7	24	—	Upland flat	do
Bf 15	Clarence Nazelrod	Edmondson	1945	350	Dr	50	6	—	Hillside	do
Bf 16	Harry Stevens	E. Brown	1952	460	Dr	100±	6	—	Upland flat	Gabbro
Bf 17	A. C. Jett	—	1924	380	Dug	27	36	—	Upland flat	Ellicott City granite
Bf 18	E. Buell	E. Brown	1949	370	Dr	50	6	35	Upland flat	Wissahickon (oligoclase)
Bf 19	Fred Kaiser	do	1949	370	Dr	90	6	45	Hillside	do
Bf 20	Edgar Zepp	do	1951	400	Dr	40	6	26	Hillside	do
Bf 21	Jules Hinton	do	1949	400	Dr	40	6	25	Hilltop	do
Bf 22	Fulton Ivy	Jenkins	1952	410	Dug	21	48	21	Hilltop	Gabbro
Bf 23	J. E. Moylen	Rogers	1948	320	Dr	90	6	30	Hilltop	do
Bf 24	Harry C. Kammer	do	1948	320	Dr	83	6	10	Hilltop	do
Bf 25	St. Johns Church	E. Brown	1951	440	Dr	100	6	35	Hillside	do
Bf 26	Edward Clark	do	1947	420	Dr	68	6	—	Hillside	Ellicott City granite
Bf 27	Irwin Gaither	do	1951	440	Dr	67	6	40	Hillside	Gabbro
Bf 28	Schultz Convalescent Home	Downin	old	410	Dr	120	6	—	Hilltop	do
Bf 29	Edward Clark	E. Brown	1930	410	Dr	103	6	—	Hilltop	do
Bf 30	Mr. Henry	do	1929	390	Dr	90	6	—	Upland flat	do
Bf 31	Varsity, Inc.	Rogers	1948	360	Dr	65	6	—	Upland flat	Wissahickon (oligoclase)
Bf 32	J. Natwick	Washington Pump and Well Co.	1935(?)	400	Dr	750	8	—	Hillside	Gabbro
Bf 33	M. Brennan and H. Merz	—	1820±	350	Dug	110	48	—	Hilltop	Wissahickon (oligoclase)
Bf 34	Village of Alberton	—	1942	240	Dr	200	—	—	Valley flat	Setters
Bf 35	Do	—	—	400	Spring	—	—	—	Hillside	do
Bf 36	M. Brennan and H. Merz	—	1820±	290	Dug	75	300	—	Hillside	Wissahickon (oligoclase)
Cc 1	Carl O. Fisher	E. Brown	1945	470	Dr	100	6	—	Hillside	Wissahickon (oligoclase)
Cd 1	L. W. Brown	E. Brown	1950	580	Dr	75	6	—	Hilltop	Wissahickon (oligoclase)
Cd 2	Leroy Brown	do	1946	570	Dr	90	6	—	Hilltop	do
Cd 3	Andrew N. Adams	do	1952	550	Dr	225	6	80	Hillside	do
Cd 4	Thomas Maher	Green	1951	490	Dr	40	6	18	Hilltop	Baltimore gneiss
Cd 5	Mrs. George Hinkson	E. Brown	1948	410	Dr	160	6	6	Hilltop	do
Cd 6	Dorsey Bell	Smith	1946	600	Dr	99	6	74.3	Hillside	Wissahickon (oligoclase)
Cd 7	J. E. Shillinger	E. Brown	1946	470	Dr	100	6	45	Hilltop	Cockeysville marble
Cd 8	William Wettern	Rogers	1947	470	Dr	33	6	—	Hilltop	Baltimore gneiss
Cd 9	Eldridge Keedy	do	1948	480	Dr	28	6	—	Valley side	do

Continued

Water level (feet below land surface)			Yield			Specific capactiy (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
22[a]	Mar. 25, 1949	30[a]	8	Mar. 25, 1949	1	1.0	J, E	D	—	See well log.
8.12	July 14, 1952	—	4	—	—	—	J, E	D	—	
22[a]	Mar. 4, 1950	55[a]	6	Mar. 4, 1950	1	0.3	J, E	D	—	
8.38	July 15, 1952									
18.89	July 28, 1952	—	—	—	—	—	J, E	D	—	
9.85	July 28, 1952	—	—	—	—	—	J, E	D	—	
						—				
18[a]	1945	—	—	—	—	—	J, E	D	—	
16.53	July 28, 1952	—	15	1952	—	—	J, E	D	—	
20[a]	July 1952	—	—	—	—		C, E	D, F	—	
18[a]	Feb. 3, 1949	—	6	Feb. 3, 1949	—	—	J, E	D	—	
50[a]	Dec. 10, 1949	80[a]	10	Dec. 10, 1949	1	0.3	J, E	D	—	
18[a]	Mar. 14, 1951	28[a]	10	Mar. 14, 1951	0.5	1.0	J, E	C	—	
11.99	Aug. 7, 1952									
22[a]	Apr. 21, 1949	28[a]	10	Apr. 21, 1949	1	1.0	J, E	D	—	
12.61	Aug. 7, 1952									
8.54	Aug. 7, 1952	—	—	—	—	—	J, E	D	—	
40[a]	Apr. 12, 1948	—	3	Apr. 12, 1948	—	—	J, E	D	—	
52.71	Aug. 7, 1952	—	8	Apr. 3, 1948	—	—	J, E	D	—	Do.
24[a]	Mar. 7, 1951	58[a]	10	Mar. 7, 1951	1.5	0.3	J, E	S	—	
35[a]	July 8, 1947	—	3	July 8, 1947	—	—	J, E	D	—	
28[a]	Nov. 16, 1951	—	3	Nov. 16, 1951	—	—	J, E	D	—	Do.
—	—	—	20	When drilled	—	—	C, E	S	—	
—	—	—	10	1930	—	—	J, E	D, F	—	
40[a]	1952	—	10	1929	—	—	C, E	D, F	—	
30[a]	Jan. 30, 1948	—	3	Jan. 30, 1948	—	—	N	N	—	Well went dry; replaced by well Bf 9. See well log.
9.21	July 21, 1952	See Remarks	10	1952	24	0.9	J, E	D	—	In spring of 1952 pumped 24 hrs at 10 gpm with 11 ft. of drawdown.
38.85	—	—	—	—	—	—	—	N	—	
—	—	—	5	1942	—	—	C, E	P	—	
—	—	—	—	—	—	—	—	P	—	Three springs. See chemical analysis.
7.72	—	—	—	—	—	—	—	D	—	
40[a]	1945	—	3	1945	—	—	C, E	D, F	—	Water reported soft. See chemical analysis.
32[a]	Sep. 21, 1950	160[a]	5	Sep. 21, 1950	1	less than 0.1	J, E	D	—	
30[a]	June 27, 1946	—	3	—	—	—	J, E	D	—	See well log.
35[a]	Jan. 1, 1952	—	8	Jan. 1, 1952	—	less than 0.1	J, E	D	—	Reported "pumps dry" at 12 g.p.m.
16.77	May 27, 1952									
18[a]	Oct. 24, 1951	24[a]	10	Oct. 24, 1951	1	1.7	NI	D	—	See well log.
8.62	May 28, 1952									
65[a]	June 25, 1948	—	2	June 25, 1948	—	—	—	D	—	
15.5[a]	Apr. 21, 1946	—	—	—	—	—	J, E	D	—	Do.
45[a]	Oct. 6, 1946	—	3	Oct. 6, 1946	1	—	J(?), E	D	—	
5[a]	1947	—	10	—	—	—	J, E	D	—	
8[a]	1948	—	—	—	—	—	J, E	D	—	

TABLE 1—

Well number (How-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Cd 10	Allen C. Clark	—	Old	480	Dug	65	48	—	Hillside	Baltimore, gneiss
Cd 11	Michel Maszaros	—	Old	510	Dug	36.7	48	—	Hillside	Wissahickon (oligoclase)
Cd 12	Louis Randall	—	Old	500	Dug	65+	48	—	Hilltop	Baltimore gneiss
Cd 13	Board of Education	Rogers	1950	560	Dr	65	6	45	Hillside	do
Cd 14	Wilson B. McCandless	E. Brown	1947	420	Dr	22	6	—	Valley	Wissahickon (oligoclase)
Cd 15	Do	—	Old	390	Dr	50	6	—	Valley	do
Cd 16	Robert White	—	1925	500	Dug	40	48	—	Hilltop	do
Cd 17	Oliver Brown	—	Before 1900	500	Dug	50	48	—	Hilltop	do
Cd 18	St. Marks Church	—	1925±	510	Dug and Dr	49	48-6	See Remarks	Upland flat	Baltimore gneiss
Ce 1	J. A. Hepding	Smith	1951	360	Dr	50	6	25	Hillside	Guilford granite
Ce 2	Mr. Schnieder	Greene	1952	380	Dr	100	6	6	Hilltop	Wissahickon (oligoclase)
Ce 3	J. C. Lewis	—	Old	310	Dug	22.8	36	—	Valley side	do
Ce 4	Bradey Mettee	—	1948	330	Dr	60	6	—	Hilltop	Guilford granite
Ce 5	Louis Brown	Rogers	1948	400	Dr	51	6	29	Hilltop	do
Ce 6	R. E. Seward	E. Brown	1950	390	Dr	50	6	25	Hilltop	do
Ce 7	Harry Saumenig	—	1951	290	Dug	26.5	36	—	Valley side	do
Ce 8	Walter E. Day	E. Brown	1945	410	Dr	38	6	—	Upland flat	Guilford granite(?)
Ce 9	Benjamin F. Bassler	Stauffer	1911	440	Dr	45	6	7	Hillside	Wissahickon (oligoclase)
Ce 10	Coy Henard	C. Henard	1947	480	Dug	18	36	—	Hillside	do
Ce 11	Louis Biller	Greene	1940	400	Dr	86	6	—	Hillside	do
Ce 12	Allview Country Club	—	Old	380	Dug	20±	30	—	Valley	do
Ce 13	Paul C. Corbitt	—	About 1900	340	Dug	20-25	48	—	Valley side	do
Ce 14	M. D. Owings	—	1925	410	Dug	34.5	48	—	Hilltop	do
Ce 15	L. J. McIntosh	—	Old	350	Dug	20.1	36	—	Hillside	Guilford granite
Ce 16	Mr. Dorsey	Peters	1925	400	Dug	22	36	—	Upland flat	do
Ce 17	C. G. Melin	—	1942	280	Dr	50	6	—	Valley side	do
Ce 18	Charles Shaw	Roger	1947	470	Dr	74.5	6	—	Upland flat	Baltimore gneiss

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
35[a]	1952	—	—	—	—	—	C, H	F	—	Reported produces "rusty water.
15.29	Aug. 15, 1952	—	—	—	—	—	C, H	D, F	—	
21.5[a]	1952	—	—	—	—	—	C, E	D, F	—	65 ft. deep in 1930; deepened an unknown amount during drought of that year because of poor yield. Water reported irony and somewhat hard.
50[a]	Jan. 27, 1950	—	2	Jan. 27, 1950	—	—	—	S	—	Highland school. See well log.
47.68	Dec. 16, 1952									
8.51	Aug. 27, 1952	—	35	1947	—	—	J, E	D	—	Well equipped with 2 pumps. Reported to produce 50,000 gal. in 24 hours. Pegmatite exposed nearby.
10[a]	Aug. 1952	—	60	—	1	—	J, E	D, F	—	Supplies 3 houses and stock. Pegmatite exposed nearby.
35[a]	1952	—	—	—	—	—	C, H	D	—	Adequate supply of soft water reported.
35[a]	1952	—	—	—	—	—	C, E	D, F	—	Deepened to present depth; supply adequate now.
—	—	—	—	—	—	—	J, E	D	—	Dug well to 29 ft; drilled and cased to 49 ft.
7.22	June 4, 1952	—	—	—	—	—	J, E	D	—	See well log.
24[a]	May 1952	—	2	—	—	—	NI	D	—	
15.25	Aug. 22, 1952	—	—	—	—	—	J, E	D	—	Water reported soft.
11[a]	1948	—	—	—	—	—	J, E	D	—	Do.
17[a]	1948	—	12	—	—	—	J, E	D, F	—	Water encountered at 29 ft.
15[a]	1950	—	21+	—	—	—	J, E	D	—	
20.15	Aug. 22, 1952	—	—	—	—	—	J, E	D	—	Water reported hard.
27[a]	1945	—	5	—	—	—	J, E	D	—	Water reported soft. Supply reported inadequate.
23[a]	1952	—	15±	—	—	—	J, E	D, F	—	Water reported soft.
2[a]	1952	—	2±	—	—	—	J, E, C, H	D	—	Do.
20[a]	1952	—	5+	—	—	—	J, E	D	—	
—	—	—					S, E	C, F	—	Water from 4 other dug wells, uphill from this one, is piped to this well. Well flows. Water reported soft.
13.12	Aug. 25, 1952	—	—	—	—	—	J, E	D, F	—	Water reported soft. Supply reported adequate.
19.59	Aug. 5, 1952	—	—	—	—	—	J, E	D	—	Water reported somewhat hard. Supply reported adequate.
12.48	Aug. 25, 1952	—	—	—	—	—	J, E	D	—	Water reported hard.
16[a]	1952	—	—	—	—	—	C, H	D	—	Well reported dry twice in last 11 years.
—	—	—	—	—	—	—	J, E	D	—	Water reported irony, somewhat hard. Supply reported adequate.
—	—	41.23	—	—	—	—	J, E	D	—	Water reported irony and soft. Pumping level Aug, 25, 1951.

TABLE 1—

Well number (How-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Ce 19	William C. Stevens	E. Brown	1952	440	Dr	69	6	—	Hillside	Wissahickon (oligoclase)
Ce 20	Charles Carroll	—	1910	400	Dr	90	6	—	Hilltop	Baltimore gneiss
Ce 21	Johns Hopkins Univ. Applied Physics Laboratory	Washington Pump and Well Co.	1953	350	Dr	100+	6	—	Valley side	Wissahickon (oligoclase)
Cf 1	Maryland State Police Barracks	Washington Pump and Well Co.	1937	232	Dr	201	8–6	54	Upland flat	Gabbro
Cf 2	Federal Communications Commission	—	1941	370	Dr	70	6	—	Hillside	do
Cf 3	Do	—	1941	390	Dr	70	6	—	Hillside	do
Cf 4	Donald K. Barrass	Smith	1951	210	Dr	67	6	44	Hillside	do
Cf 5	Frank Thompson	do	1950	310	Dr	57	6	43	Upland flat	do
Cf 6	M. G. Smith	E. Brown	1952	460	Dr	100	6	80	Hillside	do
Cf 7	Francis Cugle	do	1950	370	Dr	142	6	96	Hillside	do
Cf 8	Frank Hanson	do	1950	370	Dr	118	6	—	Hillside	do
Cf 9	M. Warczynski	Smith	1952	190	Dr	75	6	32	Hillside	do
Cf 10	G. A. Laage	do	1951	120	Dr	95	6	11	Hillside	Relay quartz diorite
Cf 11	Board of Education	Rogers	1950	300	Dr	75	6	53	Hillside	Gabbro
Cf 12	Frank Peterson	do	1946	360	Dr	70	6	—	Hillside	do
Cf 13	Jos. Giampaali	Greene	1951	220	Dr	110	6	40	Hilltop	do
Cf 14	John Kerger	Rogers	1948	330	Dr	47	6	—	Hillside	do
Cf 15	American Telephone and Telegraph Co.	E. Brown	1947	400	Dr	97	6	76	Upland flat	Wissahickon (oligoclase)
Cf 16	C. Y. Clark	do	1952	500	Dr	89	6	—	Hillside	do
Cf 17	James A. Rieger	do	1946	500	Dr	85	6	—	Hillside	Gabbro
Cf 18	Russel Bawger	do	1950	530	Dr	78	6	60	Hilltop	do
Cf 19	W. C. McFarland	Haines	1949	430	Dr	70	6	40	Hillside	do
Cf 20	E. W. Vaughn	do	1949	420	Dr	90	6	—	Hillside	do
Cf 21	Albert Bangs	—	1950	480	Dug	13	48	—	Hillside	do
Cf 22	George H. Wahland	E. Brown	1940	430	Dr	89	6	44	Draw on hillside	do
Cf 23	John Resch	Rogers	1946	470	Dr	118	6	58.5	Hilltop	Patuxent
Cf 24	Board of Education	E. Brown	1951	520	Dr	145	6	64	Hilltop	Gabbro(?)
Cf 25	A. W. Seymer	Smith	1951	360	Dr	63	6	57	Hillside	Gabbro
Cf 26	Samuel Ecker	—	Old	420	Dug	25–30	48	—	Hilltop	Wissahickon (oligoclase)
Cf 27	Elizabeth Smith	—	Old	460	Dug	38.4	48	—	Hilltop	do
Cf 28	Board of Education	—	1939	430	Dr	120	6	—	Upland flat	Gabbro
Cf 29	George Lohrig	E. Brown	1932	480	Dr	102	6	—	Upland flat	do
Cf 30	Mr. Kramer	—	1945–7	490	Dr	—	6	—	Hillside	Ellicott City granite

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
16.31	Aug. 25, 1952	—	10+	—	—	—	J, E	D	—	Rock encountered at 50 ft.
—	—	—	—	—	—	—	J, E	D, F	—	Adequate supply for 3 houses and 2 barns.
—	—	—	—	—	—	—	N	N	—	Owner's well no. 5. Not completed.
—	—	—	12	—	12	—	C, E	D	—	See well log and chemical analysis. Pump setting during test, 176 ft.
—	—	—	—	—	—	—	C, E	C	—	See chemical analysis.
12[a]	Apr. 1951	—	—	—	—	—	J, E	C	—	Do.
20[a]	Oct. 16, 1951	—	—	—	—	—	J, E	D	—	See well log.
14.6[a]	July 5, 1950	—	—	—	—	—	J, E	D	—	Water obtained at 25 and 54 ft. See well log.
19.65	July 21, 1952	—	10+	July 21, 1952	—	—	N1	D	—	Rock at 80 ft.
38[a]	Dec. 19, 1950	—	2	Dec. 19, 1950	—	—	J, E	D	—	See well log.
45[a]	Oct. 11, 1950	—	3	Oct. 11, 1950	—	—	J, E	D	—	Do.
8[a]	Mar. 17, 1952	—	—	—	—	—	J, E	D	—	Water reported hard, irony. Water encountered at 16-20 ft., 32-34 ft., and 50 ft. See well log.
17[a]	Dec. 24, 1951	—	—	—	—	—	J, E	D	—	See well log.
19.14	Aug. 5, 1952	—	2.5	1950	—	—	C, H	S	54	See well log and chemical analysis.
22.45	Aug. 5, 1952	—	3	1946	—	—	C, E	D	—	Water reported hard and irony. See well log.
25[a]	May 12, 1951	60[a]	10	May 12, 1951	0.5	0.3	J, E	D	—	Water reported somewhat hard. See well log.
20[a]	Jan. 14, 1948	—	20	Jan. 14, 1948	—	—	T, E	C	—	See well log.
15[a]	Mar. 25, 1947	58[a]	10	Mar. 25, 1947	1	0.2	—	C	—	Do.
15.71	Aug. 7, 1952	11.5±	15+	Aug. 5, 1952	2	2.5±	NI	D	—	Pumping level Aug. 5, 1952
31.15	Aug. 7, 1952	—	5	July 18, 1946	—	—	J, E	D	—	Water at 60 ft. See well log.
35[a]	Jan. 4, 1950	—	5	Jan. 4, 1950	—	—	J, E	D	—	See well log.
30[a]	June 1949	40[a]	10	June 1949	0.5	1.0	C, E	D	—	Do.
55[a]	July 1949	65[a]	7	July 1949	0.5	0.7	J, E	D	—	Do.
7[a]	Aug. 1952	—	—	—	—	—	J, E	D	—	Water reported very soft.
8[a]	Aug. 1952	—	3	—	—	—	C, E	D	—	Water reported irony; "sulphur" taste.
54[a]	Oct. 24, 1946	—	3	Oct. 24, 1946	—	—	J, E	D	—	See well log.
33[a]	July 10, 1951	48[a]	25	July 10, 1951	8	1.7	T, E	S	—	Do.
7[a]	Nov. 6, 1951	—	—	—	—	—	—	D	—	Do.
8[a]	1952	—	—	—	—	—	J, E	D, F	—	Adequate supply reported.
30.74	Aug. 25, 1952	—	—	—	—	—	C, H	N	—	Use a spring for water supply.
—	—	—	10	—	—	—	C, E	S	—	Water reported soft.
48[a]	Summer, 1950	—	10	—	—	—	J, E	D, F	—	
—	—	—	—	—	—	—	J, E	P	—	Supplies about 20 homes. Supply reported inadequate. See chemical analysis.

TABLE 1—

Well number (How-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water bearing formation
Cg 1	Spencer Heath	Hoshall	1921	210	Dr	165	6	—	Hillside	Gabbro
Cg 2	Mr. Murry	--	1929	240	Dr	170	6	—	Hillside	do
Cg 3	Mr. McSherry	Schultz	1908	220	Dr	304	—	—	Valley side	do
Cg 4	Grace Church Rectory	—	—	60	Dr	104	—	—	Valley	Relay quartz diorite
Cg 5	St. Augustine Church	—	1933	180	Dr	90	6	—	Hillside	do
Cg 6	J. E. Cassidy	D. Brown	1943	140	Dr	82	6	22	Hillside	do
Cg 7	Board of Education	Rogers	1950	30	Dr	55	6	51	Valley side	do
Cg 8	Mr. Cooper	—	1946	180	Dr	145	6	—	Hillside	do
Cg 9	Tilton Dobbin	Harr	1947	220	Dr	125	6	—	Valley side	Gabbro
Cg 10	F. L. Amberman	Rogers	1947	200	Dr	39	6	—	Hillside	Patuxent
Cg 11	H. T. Moreland	Dillon	1949	220	Dr	100	6	—	Hillside	Gabbro
Cg 12	Walter Hellman	do	1949	230	Dr	62	6	—	Hilltop	do
Cg 13	J. M. Phillips	Rogers	1946	160	Dr	36	6	—	Hillside	Patuxent
Cg 14	L. B. La Compte	do	1948	180	Dr	76	6	—	Hilltop	do
Dd 1	Maurice Brown	Beecraft	1952	510	Dug	17.6	36	—	Hillside	Baltimore gneiss
Dd 2	Ethel Judy	Robinson	1946	460	Dug	25	36	—	Hilltop	Wissahickon (oligoclase)
Dd 3	B. J. Chitiwood	Rogers	1947	450	Dr	66	6	60	Hillside	do
De 1	Kass-Burger Realty Company	E. Brown (?)	—	200	Dr	117	6	—	Hillside	Gabbro
De 2	R. R. Milner	Rogers	1949	140	Dr	35	6	27	Valley	do
De 3	Mr. Soaper	Robinson	1892	400	Dug	27.1	48	—	Valley side	Wissahickon (oligoclase)
De 4	Board of Education	Washington Pump and Well Co.	1939	440	Dr	294	6	—	Upland flat	do
De 5	Mr. Lloyd	Beecraft	1950	420	Dug	20	30	20	Hillside	do
De 6	St. Pauls Lutheran Church	—	1920	400	Dug	35	36	35	Hillside	do
De 7	Mrs. Iager	—	1932	380	Dr	96	6	—	Hillside	do
De 8	Scott Brown	—	1896	380	Dug	35	48	—	Valley side	do
De 9	Herbert Wessel	Beecraft	1952	420	Dug	47	36	—	Hilltop	do
De 10	George Greaul	—	1952	440	Dr	122	6	105	Hilltop	do
De 11	Olney Acres Dairy	Sydnor Pump and Well Co.	1949	400	Dr	130	6	42.1	Hilltop	do
De 12	do	do	1950	360	Dr	412	6	14.5	Valley side	do
De 13	R. R. Milner	Smith	1952	140	Dr	80	6	19	Valley	Gabbro
De 14	C. P. Diehl	do	1952	160	Dr	102	6	30	Valley side	do
De 15	Johns Hopkins Univ. Applied Physics Laboratory	Washington Pump and Well Co.	1952	450	Dr	375	8	79	Hilltop	Wissahickon (oligoclase)
De 16	Do	do	1953	420	Dr	62	8	51	Draw on hillside	Pegmatite and Wissahickon (oligoclase)
De 17	Do	do	1953	390	Dr	100	6	22	Valley	do

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
—	—	—	30	1921	—	—	C, E	D	—	See chemical analysis.
—	—	—	25	1929	—	—	—	—	—	Exact location unknown.
—	—	—	17	1908	—	—	—	—	—	Do.
—	—	—	Heavy flow	—	—	—	—	—	—	Was 104 ft. deep, but filled in to 60 ft. Water very hard. Exact location unknown.
—	—	—	—	—	—	—	—	—	—	High iron.
3.77	Apr. 23, 1952	—	—	—	—	—	C, H	N	—	Well not used because of high iron content.
5.49	Apr. 22, 1952	—	2	Feb. 13, 1950	—	—	C, H	S	—	See well log.
55.30	Apr. 23, 1952	—	—	—	—	—	C, E	—	—	
40[a]	Oct. 1, 1947	80[a]	10	Oct. 1, 1947	8	0.2	C, E	D	—	Do.
20[a]	Feb. 14, 1947	—	8	Feb. 14, 1947	—	—	N	N	—	Well destroyed. See well log.
40[a]	Jan. 17, 1949	—	2	Jan. 17, 1949	—	—	N	N	—	Do.
30[a]	Jan. 10, 1949	—	3	Jan. 10, 1949	—	—	N	N	—	Well destroyed.
—	—	—	15	May, 1946	—	—	N	N	—	Well destroyed. See well log.
51[a]	May 1948	—	25	May 1948	3	—	C, E	C	—	Driller reported no drawdown at 25 g.p.m. See well log.
8.02	July 30, 1952	—	—	—	—	—	C, E	D	—	
16.23	July 30, 1952	—	—	—	—	—	C, H	D	—	
15[a]	June 28, 1947	—	8	—	—	—	J, E	D	—	See well log.
18.58	Apr. 21, 1952	—	6	1952	—	—	C, E	C	—	
3[a]	May 1952	—	5	Sept. 19, 1949	—	—	J, E; C, H	C	—	See well log and chemical analysis.
17.34	Aug. 21, 1952	—	5	1952	—	—	J, E	D, F	—	
25.24	Aug. 21, 1952	—	10	1939	—	—	C, E	S	—	
6.24	Apr. 29, 1952	—	—	—	—	—	J, E	D	—	Adequate supply.
8[a]	Apr. 29, 1952	—	—	—	—	—	J, E	D	—	
12[a]	1952	—	—	—	—	—	N	N	—	Well destroyed in 1950.
—	—	—	—	—	—	—	J, E	D	—	
35.44	Apr. 29, 1952	—	—	—	—	—	NI	D	—	
24.06	Nov. 7, 1952	—	5	Nov. 7, 1952	—	—	NI	D	—	
29[a]	Oct. 20, 1949	75[a]	30	Oct. 20, 1949	24	0.7	C, E	D	—	Owner reports yield of 60 gpm. See well log.
8[a]	Oct. 28, 1950	—	33	Oct. 28, 1950	9	—	T, E	F, C	—	Iron content reported 5·7 ppm. See well log.
5[a]	June 11, 1952	—	14	June 6, 1952	6	—	J, E	C	—	See well log. Water-bearing zones at 8–15 ft., 22 ft., 38 ft., 65 ft., and 67 ft.
13.6[a]	Sept. 25, 1952	62[a]	10	Sept. 25, 1952	1	0.2	J, E	C	—	See well log. Water-bearing zones at 79 and 95 ft.
42[a]	Jan. 26, 1953	290[a]	4	Jan. 26, 1953	10	less than 0.1	N	N	—	Owner's well number 1. See well log. Pumping level, Jan. 28, 1953.
4[a]	Feb. 6, 1953	50[a]	18	Feb. 6, 1953	24	0.4	NI	S	54.0	Owner's well number 2. See well log and chemical analysis.
9[a]	Feb. 23, 1953	29[a]	75	Feb. 23, 1953	12	3.7	NI	S	53.0	Owner's well number 3. See well log. Temperature measured when well was 42 feet deep.

TABLE 1—

Well number (How-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
De18	Johns Hopkins Univ. Applied Physics Laboratory	WashingtonPump and Well Co.	1953	440	Dr	125	6	51.5	Hilltop	Wissahickon (oligoclase)
Df 1	M. J. Henkel	Washington Pump and Well Co.	1946	170	Dr	128	6	124	Hillside	Patuxent
Df 2	J. D. Grubb	—	—	220	Dug	26	48	—	Hillside	do
Df 3	D. M. Hanauer	—	—	240	Dr	80	4	—	Hillside	Patuxent (?)
Df 4	Ashby Corum	Washington Pump and Well Co.	1948	270	Dr	108	6	104	Hilltop	Patuxent
Df 5	George R. Thrasher	—	1947	180	Dr	150±	6	—	Hilltop	do
Df 6	W. T. Wade	—	1900	200	Dug	60	48	—	Hillside	do
Df 7	G. P. Morrell	Rogers	1949	220	Dr	148	6	—	Hillside	Gabbro
Df 8	H. S. Cannell	do	1948	180	Dr	88	6	85	Hillside	do
Df 9	C. R. Mencken	—	1947	220	Dr	—	6	—	Hillside	Patuxent
Df 10	H. J. Poist and Co.	Washington Pump and Well Co.	1949	160	Dr	182	6	36	Upland flat	Gabbro
Df 11	Robert Mathews	Smith	1950	220	Dr	80	6	49	Hillside	do
Df 12	A. B. Engleman	Harr	1952	270	Dr	117	6	—	Hilltop	Patuxent
Df 13	H. W. Parisius	—	1945	180	Dug	22	60	—	Valley side	Gabbro
Df 14	W. A. Threadgill	Smith	1951	210	Dr	60	6	32	Valley	do
Df 15	Maurice Haslup	Rogers	1947	240	Dr	104	6	—	Upland flat	do
Df 16	Board of Education	do	1948	260	Dr	123	6	—	Valley side	do
Df 17	John Goris	Smith	1951	300	Dr	304	6	126	Hilltop	do
Df 18	Laurel Harness Racing Corp.	Columbia Pump and Well Co.	1948	160	Dr	300	8	21	Valley side	do
Df 19	Paul Pfister	Rogers	1949	250	Dr	75	6	—	Hillside	Patuxent

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
40[a]	Mar. 12, 1953	105[a]	5	Mar. 12, 1953	9	0.1	N	N	—	Owner's well number 4. See well log.
48[a]	Mar. 1, 1946	65[a]	35	Mar. 1, 1946	—	2.0	C, E	D	—	See well log.
44.52	Mar. 7, 1946									
—	—	—	—	—	—	—	J, E	D	—	
—	—	—	—	—	—	—	J, E	D	—	
92[a]	Nov. 1948	97[a]	8	Nov. 1948	6	1.6	J, E	D	—	Do.
—	—	—	—	—	—	—	C, E	D	—	
—	—	—	—	—	—	—	C, E	D, F	—	
55[a]	July 1949	—	1.5	—	—	—	J, E	C	—	Do.
26.30	Mar. 23, 1952	—	—	—	—	—	J, E	D	—	Do.
55.25	Apr. 23, 1948	—	—	—	—	—	J, E	D	—	
6[a]	Apr. 12, 1949	52[a]	40	Apr. 12, 1949	—	0.9	C, E	C	—	Do.
7.06	June 4, 1952									
26[a]	Nov. 14, 1950	—	—	—	—	—	J, E	D	—	Do.
45[a]	Jan. 1950	—	9	—	—	—	J, E	C	—	
—	—	—	—	—	—	—	C, E	C	—	
20[a]	July 11, 1951	—	—	—	—	—	C, H	D	—	Do.
44[a]	Sept. 25, 1947	—	3	Sept. 25, 1947	—	—	J, E	C	—	
22[a]	June 17, 1948	62[a]	30	June 17, 1948	—	0.8	C, H	S	—	Guilford School. See well log.
138[a]	June 12, 1951	—	—	—	—	—	—	C	—	See well log.
4[a]	June 8, 1948	—	See Remarks	June 8, 1948	—	—	N	N	—	Driller reported well produced 100 g.p.m. for 15 minutes then went dry, and that it might yield 5 g.p.m. See well log.
—	—	—	8	Nov. 7, 1949	—	—	C, E	C	—	See well log.

TABLE

Records of Wells in

Type of well: Dr, drilled.
Water level: Reported water levels are designated by "a".
Pumping equipment: Method of lift: B, bucket; C, cylinder; J, jet; N, none; NI, pump to be installed; S, suction; T, turbine.
Type of power: E, electric motor; G, gasoline engine; H, hand.
Use of water: C, commercial; D, domestic; F, farming (includes irrigation, stock consumption, etc.); N, none; P, public sup
Remarks: Well logs and chemical analyses referred to are listed in Tables 4 and 17.

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Bc 1	N. M. Bly	—	—	440	Dr	74	6(?)	—	Valleyside	Ijamsville phyllite
Bd 1	Unknown	—	1919	480	Dr	85	6	—	Hillside	do
Bd 2	Mrs. Winona Read	Green	1952	560	Dr	165	6	30	Hillside	do
Bd 3	Leslie Beall	D. Brown	1916	600	Dr	115	6	5	Hillside	do
Bd 4	Do	Green	1952	610	Dr	120	6	21	Hillside	do
Bd 5	Reginald Cross	D. Brown	1951	440	Dr	86	6	6	Valleyside	do
Bd 6	F. E. Blood	—	Old	560	Dr	75	6	—	Hilltop	do
Bd 7	Do	—	Old	540	Dr	80-90	6	—	Hilltop	do
Bd 8	Do	—	—	610	Dr	80±	6	—	Hillside	do
Bd 9	William Smith	Green	1944-45	560	Dr	80	6	—	Hillside	do
Be 1	Mount Lebanon Church	—	Old	710	Dr	58	6	—	Hillside	do
Be 2	Board of Education	Washington Pump and Well Co.	1949	780	Dr	572	8	33	Hillside	do
Be 3	Do	do	1949	730	Dr	370	8	80	Valleyside	do
Be 4	Do	—	1932	800	Dr	125-140	6	—	Hillside	do
Be 5	Do	—	1932	750	Dr	100-150	6	—	Valleyside	do
Be 6	Mrs. S. Saunders	—	—	840	—	150±	—	—	Hillside	do
Be 7	Board of Education	Greene	1949	800	Dr	100	6	21	Draw on hillside	do
Be 8	L. Day	E. Brown	Before 1941	750	Dr	44	6	—	Hillside	do
Be 9	Do	Green	About 1930	750	Dr	90	6	3±	Hillside	do
Be 10	Do	do	1948	740	Dr	126	6	—	Hillside	do

2

Montgomery County

ply; S, school or institution.

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
26.99	Jan. 5, 1953	—	—	—	—	—	J, E	D	—	
—	—	—	—	—	—	—	C, H	D	—	
50[a]	Dec. 29, 1952	70[a]	10	Dec. 29, 1952	1	0.5	J, E	D	—	See well log.
55[a]	—	75[a]	5	—	5	0.25	C, E	D	—	Originally 84 ft. deep; drilled deeper because of insufficient yield. 111 ft. of pump pipe.
—	—	—	12	1952	5	—	T, E	S	—	Pump set at 116 ft.
19.44	Dec. 30, 1952	—	—	—	—	—	J, E	D	—	
27.57	Dec. 30, 1952	—	—	—	—	—	C, E	S	—	Water reported corrosive.
—	—	—	—	—	—	—	C, H	N	—	
19.74	Dec. 30, 1952	—	—	—	—	—	C, E	D	—	
16.04	Dec. 30, 1952	—	—	—	—	—	C, H	D	—	
41.52	Nov. 25, 1952	—	—	—	—	—	C, H	N	—	Water-level observation, well.
38[a]	Mar. 2, 1949	250[a]	6.5	Mar. 2, 1949	12	less than 0.1	C, E	S	—	Damascus High School. Most of water between 40-100 ft. See well log.
18.25	Apr. 1, 1949	—	—	—	—	—	C, E	N	—	Damascus High School. Muddy water at 35-38 ft.; no additional water encountered. See well log.
—	—	—	—	—	—	—	C, E	S	—	Damascus Elementary School. Well "pumps dry' in 20 to 30 minutes.
—	—	—	—	—	—	—	C, E	S	—	Damascus Elementary School. In dry weather well "pumps dry" in about 15 minutes.
—	—	—	—	—	—	—	J. E	D, F	—	Supplements Damascus Elementary School suply.
8[a]	May 10, 1949	—	15-19	May 10, 1949	12	—	C, E	S	—	Damascus High School. See chemical analysis.
30[a]	Before 1941	—	5	Before 1941	—	—	N	N	—	
30.05	Sept. 30, 1952	—	—	—	—	—	J. E	D, F	—	About 40 ft. of weathered material encountered. Poor yield reported. Drilled about 5 ft. south of Be 8.
—	—	—	—	—	—	—	J, E	D, F	—	Poor yield reported. Water encountered near land surface. About 40 ft. of weathered rock encountered. Water reported hard and irony.

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Be 11	L. Day	—	Old	740	Dr	—	6(?)	—	Hillside	Ijamsville phyllite
Be 12	William Scott	E. Brown	1922	800	Dr	100	6	—	Hillside	do
Be 13	Carl A. Moyer	do	1918	770	Dr	100(?)	6	—	Hilltop	do
Be 14	Do	E. Brown (?)	1947	770	Dr	100±	—	—	Hilltop	do
Be 15	Do	do	1947	740	Dr	100±	—	—	Draw on hillside	do
Be 16	Paul G. Martin	—	Before 1920	710	Dr	—	—	—	Draw on hillside	do
Be 17	Do	—	1938	700	Dr	—	6	—	Draw on hillside	do
Be 18	Do	—	—	825	Dr	120	—	—	Hilltop	do
Be 19	W. J. Appleby	—	Before 1890	790	Dr	70–80	6	—	Hilltop	do
Be 20	J. G. Woodfield	Green	1946	720	Dr	90	6	—	Hillside	do
Be 21	Kingstead Farms	—	1932	610	Dr	60	—	—	Hillside	do
Be 22	Do	—	—	610	Dug	10	36±	—	Valley	do
Be 23	Do	—	—	590	—	20	—	—	Valleyside	do
Be 24	D. F. Brown	—	1880±	690	Dr	60	6	—	Hillside	do
Be 25	Do	E. Brown	—	720	Dr	110	6	90	Hillside	do
Be 26	Do	—	1912	710	Dr	60	6	—	Hilltop	do
Be 27	Dewey Brown	D. Brown	1952	720	Dr	39	6	—	Hillside	do
Be 28	Roscoe F. Buxton	do	1949	700	Dr	35	6	—	Hillside	do
Be 29	Marshall W. Buxton	do	1940	640	Dr	78	6	—	Draw on hillside	do
Be 30	Do	Easterday	1951	660	Dr	140	6	—	Hillside	do
Be 31	Do	—	Old	600	Dr	45	6	45	Draw on hillside	do
Be 32	Russell Duvall	E. Brown	1933	830	Dr	119	—	—	Hillside	do
Be 33	Roger Poole	—	Before 1942	790	Dr	89	—	—	Hillside	do
Be 34	George A. Poreous	Greene	1946	790	Dr	90	6	0	Hillside	do
Be 35	Russell Duvall	E. Brown	1919	840	Dr	69	6	—	Hilltop	do
Be 36	Boyer and Kramer Hardware Store	do	1933	820	Dr	116–119	8	—	Hilltop	do
Bf 1	Russell Moore	—	1900±	630	Dr	50±	6	—	Hilltop	Wissahickon (albite)
Bf 2	Do	Cane	1920±	620	Dr	65	6	—	Hilltop	do
Bf 3	G. Howes	E. Brown	1948	580	Dr	90	6	20	Hilltop	do

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
—	—	—	—	—	—	—	C, E	F	—	Poor yield reported.
84.72	Sept. 30, 1952	—	3	1922	—	—	C, E	D	—	
57.85	Sept. 30, 1952	—	4	1918	—	—	C, N	N	—	Well may be 65 ft. deep. Abandoned because of low yield and poor quality.
—	—	—	—	—	—	—	N	N	—	Well destroyed because of poor yield. Replaced by Be 15.
46.85	Sept. 30, 1952	—	—	—	—	—	J, E	D	—	Good yield reported.
25.59	Oct. 1, 1952	—	—	—	—	—	C, E	D	—	
17.40	Oct. 1, 1952	—	—	—	—	—	J, E	F	—	Good yield reported.
—	—	—	—	—	—	—	J, E	D	—	115 ft. of pump column.
42.45	Oct. 1, 1952	—	—	—	—	—	C, H	D	—	
40.15	Oct. 1. 1952	—	—	—	—	—	J, E	D	—	Good yield reported.
20[a]	1952	—	10–12	1952	—	—	J, E	D, F	—	Good yield reported. 40 ft. of pump column.
3.84	Oct. 1, 1952	—	—	—	—	—	C, H	N	—	
—	—	—	—	—	—	—	N	N	—	Poor yield reported. Destroyed in 1932.
37.87	Oct. 1, 1952	—	—	—	—	—	C, H	D	—	Good yield reported. Water reported irony.
69.64	Oct. 1, 1952	—	—	—	—	—	C, E	D	—	Reported penetrated 98 ft. of hard rock, then 2 ft. of water-bearing sand.
—	—	—	—	—	—	—	C, H	D	—	Two unsuccessful wells drilled before this one. Fair yield reported.
12.52	Oct. 2, 1952	—	—	—	—	—	N1	D	—	
13.30	Oct. 2, 1952	—	—	—	—	—	J, E	D	—	Good yield reported.
—	—	—	—	—	—	—	C, E	D, F	—	
37.27	Oct. 2, 1952	—	—	—	—	—	J, E	F	—	Drilled to supplement Mont-Be 29.
32.35	Oct. 2, 1952	—	—	—	—	—	C, H	D	—	Water reported irony.
80[a]	1933	—	4	—	—	—	—, E	D	—	Water reported soft.
41.2	Oct. 2, 1952	—	—	—	—	—	C, E	D, F	—	
45[a]	Oct. 29, 1946	51[a]	10	Oct. 29, 1946	0.5	1.7	J, E	D	54	See chemical analysis.
39[a]	—	—	4	—	—	—	—	D	—	
80	1933(?)	—	4	1933(?)	—	—	N	N	—	Water contaminated witb gasoline (1948).
—	—	—	—	—	—	—	N	N	—	Abandoned because of turbid water.
32.36	Sept. 30, 1952	—	—	—	—	—	J, E	D, F	—	Good yield reported.
40[a]	Oct. 29, 1948	60[a](?)	6	Oct. 29, 1948	—	0.3	C, H	D	—	
35.53	Sept. 30, 1952									

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Cb 1	R. T. Dayhoff	Stottlemyer	1946	440	Dr	80	6	15	Hillside	New Oxford
Cb 2	Robert J. Day	—	Before 1936	330	Dr	75	8(?)	—	Hilltop	do
Cb 3	Mr. Watkins	—	1950±	240	Dr	100±	6	—	Valleyside	do
Cb 4	Board of Education	Green or Greene	1952	320	Dr	129	6	—	Hilltop	do
Cb 5	Do	—	1922	320	Dr	75	6	—	Hilltop	do
Cb 6	Harry Glickman	—	1937±	380	Dr	65–70	6	—	Hilltop	do
Cb 7	Do	Hilton	1949	340	Dr	74	6	30	Valleyside	do
Cb 8	W. K. Mathews	do	1938	400	Dr	50	6	—	Upland flat	do
Cb 9	F. Bliss	—	—	400	Dr	95	6	—	Hillside	do
Cb 10	Do	—	—	370	Dr	65	6	—	Hillside	do
Cb 11	M. Lonie	Hilton	1931	380	Dr	94	6	—	Hilltop	do
Cb 12	F. Bliss	—	—	360	Spring	—	—	—	Valleyhead	do
Cb 13	County Highway Department(?)	—	—	240	Spring	—	—	—	Valleyside	do
Cc 1	Mr. Petticord	Stottlemyer	1948	590	Dr	90	6	30	Hilltop	Ijamsville phyllite
Cc 2	W. S. Farr	Hilton	1951	460	Dr	125	6	—	Hillside	Harpers phyllite
Cc 3	Do	do	1948	440	Dr	112	6	66	Hillside	Ijamsville phyllite
Cc 4	Do	do	1948	470	Dr	48	6	20	Valley	do
Cc 5	T. W. Brown	Stottlemyer	1949	570	Dr	100	6	33	Hilltop	do
Cc 6	H. G. Sangster	Hilton	1952	530	Dr	165	6	32	Hillside	do
Cc 7	W. W. Hodges	—	—	570	Dr	45	6	—	Hillside	do
Cc 8	Do	—	—	570	Dug	50	48	—	Hillside	do
Cc 9	Clyde McLane	Hilton	1952	400	Dr	55	6	18	Hillside	do
Cc 10	Edgar Knill	do	1949	540	Dr	74	6	40	Hilltop	do
Cc 11	Maynard Fink	do	1932	560	Dr	88	6	10	Hillside	do
Cc 12	Sellman School	—	1925	550	Dr	70	6	—	Hilltop	do
Cc 13	Sellman Church	Greene	1950	550	Dr	100	6	15	Hillside	do
Cc 14	Mr. Hayes	—	1850±	550	Dug	45	60	—	Hilltop	do
Cc 15	Do	Hilton	—	550	Dr	80	6	—	Hilltop	do
Cc 16	W. B. Hilton	do	—	570	Dr	400	6	—	Hilltop	do
Cc 17	Do	do	—	520	Dr	86	6	—	Hillside	do
Cc 18	Stevens	do	1949	570	Dr	74	6	68	Hillside	do
Cc 19	W. M. White	do	1943	460	Dr	80	6	—	Hilltop	Harpers phyllite
Cc 20	Do	—	1940	460	Dr	60	6	—	Hillside	do
Cc 21	Mr. Chisholm	Hilton	1929	520	Dr	62	6	16	Hilltop	Ijamsville phyllite

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hous)					
10[a]	Mar. 5, 1946	75[a]	7	Mar. 5, 1946	1	0.1	C, H	D	54	See chemical analysis.
37.92	Nov. 5, 1952	—	—	—	—	—	C, H	D	—	Water reported hard. Supply reported adequate.
See Remarks	1950±	—	—	—	—	—	J, E	D	—	Water level reported near surface. Reported depth highly questionable.
5[a]	1952	—	—	—	—	—	J, E	S	—	Dickerson school. Supply reported adequate.
—	—	—	—	—	—	—	J, E	S	—	Dickerson school. Standby well.
55.60	Nov. 12, 1952	—	—	—	—	—	C, E	D	—	Another well (no data) used for farming and stock purposes.
40[a]	Mar. 25, 1949	50[a]	2.5	Mar. 25, 1949	1	0.3	C, E	D	—	Tenant house. See well log.
14.64	Nov. 13, 1952	—	—	—	—	—	J, E	D, F	—	Good yield reported.
47.10	Nov. 13, 1952	—	—	—	—	—	C, E	D, F	—	
18.10	Nov. 13, 1952	—	—	—	—	—	S, E	D	—	
—	—	—	30	—	—	—	C, E	D	—	
—	—	—	—	—	—	—	S, E	D	—	Small flow. Collecting basin is a barrel.
—	—	—	1±	Nov. 5, 1952	—	—	N	D	—	Rock-lined; recessed into hillside.
30[a]	Nov. 12, 1948	50[a]	10	Nov. 12, 1948	1	0.5	C, E	D	—	
26[a]	June 6, 1951	63[a]	45	June 6, 1951	4	1.2	C, E	D	—	See well log.
35[a]	Oct. 18, 1948	50[a]	30	Oct. 18, 1948	3	2.0	C, E	D	—	Do.
25[a]	Oct. 3, 1948	35[a]	4.5	Oct. 3, 1948	1	0.5	J, E	D	—	
22[a]	Oct. 10, 1949	95[a]	3	Oct. 10, 1949	1	0.1−	J, E	D	—	
18[a]	Feb. 2, 1952	—	0.5	Feb. 2, 1952	—	—	C, E	D	—	Do.
20[a]	1952	—	—	—	—	—	J, E	D, F	—	Adequate supply.
18[a]	1952	—	—	—	—	—	J, E	D, F	—	Inadequate supply during dry periods.
20[a]	June 2, 1952	35[a]	30	June 2, 1952	1	2.0	S, E	D	—	
30[a]	Feb. 28, 1949	40[a]	10	Feb. 28, 1949	1	3.0	J, E	D	—	
35–40[a]	1934	—	9	1932	—	—	J, E	D	—	Water obtained from white "flint".
28.71	Nov. 12, 1952	—	—	—	—	—	N	N	—	
20.16	Nov. 12, 1952	100[a]	7	Mar. 1, 1950	—	—	J, E	S	—	See well log, Pumping level Mar. 1, 1950
40.65	Nov. 12, 1952	—	—	—	—	—	B, H	D	—	
—	—	—	—	—	—	—	—, E	D	—	
—	—	—	0.2	—	—	—	N	N	—	Well abandoned but not destroyed.
—	—	—	4	—	—	—	—	D	—	
40[a]	Feb. 24, 1949	60[a]	10	Feb. 24, 1949	1	0.5	C, H	D	—	Water is turbid.
49.06	Nov. 13, 1952	—	—	—	—	—	C, E	D, F	—	
—	—	—	—	—	—	—	N	N	—	Destroyed because of bad taste.
29.54	Nov. 14, 1952	—	14	Jan. 10, 1929	—	—	C, E	D, F	—	Water reported corrosive. Test pump capacity was 14 gpm; owner thinks well is capable of a much larger yield. Water encountered in white "flint."

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Cc 22	W. B. Griffith	Hilton	1951	500	Dr	86	6	46	Hilltop	Ijamsville phyllite
Cc 23	Mr. Applebee	Stottlemyer	1946	450	Dr	85	6	—	Hilltop	Harpers phyllite
Cc 24	Edward Maxwell	Hilton	1949	600	Dr	86	6	—	Hilltop	Ijamsville phyllite
Cd 1	Melvin Carlin	Hilton	1951	560	Dr	151	6	30	Hillside	do
Cd 2	John G. Knott	Easterday	1952	580	Dr	95	6	22	Hillside	do
Cd 3	Kevin Wade	Green	1952	490	Dr	89	6	22	Hilltop	do
Cd 4	Dr. Ernst Sheppard	Hilton	1951	540	Dr	99	6	68	Hillside	Wissahickon (albite)
Cd 5	Henry Hough	do	1948	670	Dr	87	6	45	Hillside	Ijamsville phyllite
Cd 6	Richard Howard	do	1948	610	Dr	55	6	25	Hillside	Wissahickon (albite)
Cd 7	W. E. Bergfield	D. Brown	1952	560	Dr	38	6	—	Hillside	Ijamsville phyllite
Cd 8	Willard Wiley	Greene	1949	500	Dr	80	6	—	Hillside	do
Cd 9	Lloyd Sandbower	—	1910	440	Dr	—	—	—	Hilltop	Wissahickon (albite)
Cd10	Board of Education	—	1951	330	Dr	40	6	—	Hillside	diabase (Triassic)
Cd11	Wilson Wims	Green	1948	560	Dr	90	6	—	Hillside	Wissahickon (albite)
Cd12	Richard Cissel	Easterday	1952	640	Dr	84	6	—	Hillside	do
Cd13	O. W. Hammond	Green	1948	680	Dr	135	6	15	Valleyside	Ijamsville phyllite
Cd14	Leo Nicols	do	1949	620	Dr	85	6	—	Hillside	do
Cd15	Board of Education	—	1922	550	Dr	75	6	—	Hillside	Wissahickon (albite)
Cd16	Richard Whiteman	E. Brown	1924	670	Dr	112	6	—	Hilltop	Ijamsville phyllite
Cd17	Mr. Davidson	do	1926	660	Dr	118	6	—	Hillside	do
Cd18	Board of Education	—	1918	640	Dr	80	6	—	Hillside	do
Cd19	Do	Green	1946	650	Dr	—	6	—	Valleyside	do
Cd20	J. M. Trigoning	—	1945	640	Dr	90	8	—	Draw	Wissahickon (albite)
Cd21	Board of Education	—	1924	500	Dr	105	6	—	Hilltop	Contact-Ijamsville phyllite and Wissahickon (albite)
Cd22	Nettie Ganley	Hilton and Green	1940	460	Dr	110	6	16	Hillside	Wissahickon (albite)
Ce1	Salem Church	Greene	—	680	Dr	90	6	—	Hillside	Ijamsville phyllite
Ce2	Mr. Johnson	—	Before 1937	500	Dr	67	6	—	Hilltop	Wissahickon (albite)
Ce3	Kermit Hawkins	Easterday	1951	450	Dr	83	6	—	Hilltop	basic rocks
Ce4	Board of Education	—	1923	450	Dug	70	6	—	Hilltop	do
Ce5	Goshen Church	—	Old	480	Dr	45	6	—	Hilltop	Wissahickon (albite)
Ce6	Edgar Allen	Green	1945	430	Dr	100	6	22	Hilltop	do
Ce7	Mr. Burton	—	Old	400	Dug	34	42	—	Hillside	Contact-Wissahickon (albite) and basic rocks
Ce8	Mr. Huddleston	—	Before 1947	500	Dr	79	—	—	Valley	Wissahickon (albite)
Ce9	L. H. Van Kirk	—	1951±	520	Dr	—	6	—	Hilltop	Ijamsville phyllite
Ce10	J. R. Ward	E. Brown	Before 1924	550	Dr	116	6	—	Draw on hillside	Wissahickon (albite)
Ce11	Owens or Frazier	—	1951–52	410	Dr	20	6	—	Hillside	do
Ce12	Joseph Howell	—	—	530	Dr	44.5	6	—	Hillside	Ijamsville phyllite

Continued

Water level (feet below land surface)			Yield							
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)	Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
28[a]	Dec. 23, 1951	60[a]	20	Dec. 23, 1951	2	0.6	C, E	D	—	See well log.
46.10	Nov. 14, 1952									
45[a]	Mar. 12, 1946	70[a]	20	Mar. 12, 1946	1	0.8	—, E	D	—	Do.
42[a]	Sept. 6, 1949	65[a]	12	Sept. 6, 1949	1	0.5	J, E	N	—	
40[a]	Aug. 16, 1951	80[a]	2	Aug. 16, 1951	1	less than 0.1	J, E	D	—	Water obtained at 70 feet. See well log.
12[a]	Aug. 8, 1952	—	2	Aug. 8, 1952	—	—	C, H	D	—	
49[a]	Mar. 1952	—	30	Mar. 1952	—	—	J, E	D	—	
36[a]	Sept. 11, 1951	58[a]	15	Sept. 11, 1951	1	0.7	—	D	—	See well log.
40[a]	Oct. 6, 1948	70[a]	5.5	Oct. 6, 1948	1	0.2	—	D	—	Do.
30[a]	Oct. 9, 1948	45[a]	5	Oct. 9, 1948	1	0.3	J, E	D	—	
12[a]	Aug. 1952	—	30	Aug. 1952	—	—	J, E	D	—	
—	—	—	—	—	—	—	J, E	D	—	
—	—	—	—	—	—	—	J, E	D	—	Adequate supply.
—	—	—	—	—	—	—	J, E	S	—	
—	—	—	—	—	—	—	J, E	D	—	
34[a]	July 29, 1952	84[a]	5	July 29, 1952	—	—	J, E	D	—	See well log.
10.85	Oct. 24, 1952									
30[a]	Nov. 5, 1948	70[a]	10	Nov. 5, 1948	1	0.2	C, H	D	—	Do.
43.34	Oct. 24, 1952	—	—	—	—	—	J, E	D	—	
—	—	—	—	—	—	—	C, H	D	55	See chemical analysis.
50[a]	1934	—	2	—	—	—	C, E	D, F	—	
70[a]	1934	—	4	—	—	—	C, E	D	—	
—	—	—	—	—	—	—	N	N	—	Clarksburg School. Well abandoned and plugged; replaced by well Cd19.
—	—	—	—	—	—	—	J, E	S	—	Clarksburg School. Supply reported not quite adequate.
—	—	—	—	—	—	—	T, E	D, F	—	
—	—	—	—	—	—	—	J, E	S	—	Germantown School. Supply adequate for school of 150 students.
—	—	—	.5	—	—	—	C, H	D	—	Drilled to 83 feet in 1923.
—	—	—	—	—	—	—	C, E	D	—	Water reported hard.
35±	Oct. 17, 1952	—	—	—	—	—	C, E	D, F	—	Good yield reported.
25[a]	July 6, 1951	83[a]	3	July 6, 1951	—	0.1—	J, E	D	—	See well log.
20.82	Oct. 17, 1952	—	—	—	—	—	C, H	N	—	
39.99	Oct. 22, 1952	—	—	—	—	—	C, H	N	—	
50[a]	Nov. 8, 1945	70[a]	12	Nov. 8, 1945	2	0.6	—	D	—	Do.
29.78	Oct. 24, 1952	—	—	—	—	—	J, E	D, F	—	
43.94	Oct. 24, 1952	—	—	—	—	—	J, E	D, F	—	Good yield reported.
—	—	—	—	—	—	—	J, E	D, F	—	
90[a]	1924	—	5	—	—	—	J, E	D, F	—	
14.45	Oct. 27, 1952	—	—	—	—	—	C, H	D	—	
9.64	Oct. 24, 1952	—	10	—	3	—	J, E	D	—	Water reported hard.

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Ce13	George W. Beers	—	Before 1947	420	Dr	101	6	—	Hilltop	Wissahickon (albite)
Cf1	Village of Mount Zion	—	Old	513	Dug	25.5	36	—	Upland flat	Sykesville
Cf2	J. T. and E. C. Nicolson	—	Old	490	Dug	—	48	—	Valleyside	do
Cf3	Henry Gassaway	—	Old	520	Dug	18.9	30	—	Upland flat	do
Cf4	Vernon Dowling	Greene	—	510	Dr	92	6	—	Hillside	do
Cf5	William Lowe	—	1947	520	Dr	120	6	—	Hillside	do
Cf6	William Royer	Green	1940	560	Dug-Dr	200	48–6	0	Hillside	Wissahickon (albite)
Cf7	Charles Richards	Easterday	1951	620	Dr	98	6	90	Hilltop	do
Cf8	George W. Snoffer	Greene	1951	600	Dr	100	6	80	Hilltop	do
Cf9	W. A. Bogley	do	—	540	Dr	65	6	—	Hilltop	do
Cf10	M. L. Mayne	W. A. Bogley	1895	540	Dug	42	48	—	Hilltop	do
Cf11	E. D. Frye	—	1936	550	Dr	72	6	—	Hilltop	do
Cf12	Do	—	1850±	540	Dug	65	48	—	Hillside	do
Cf13	Leck's Farm	—	1945	620	Dr	88	6	—	Hilltop	do
Cf14	Roger Bogley	Greene	1947	580	Dr	79	6	67	Hilltop	do
Cf15	Do	—	1920	580	Dug	36	24	—	Hilltop	do
Cf16	Gillis C. Owings	—	1936	590	Dr	83	5	—	Hilltop	do
Cg1	C. C. Saine	Greene	—	420	Dr	101	6	—	Hillside	Wissahickon (oligoclase)
Cg2	S. S. Stabler	Green	1946	420	Dr	100	6	50	Hilltop	do
Cg3	Brighton Church	E. Brown	—	480	Dr	94	6	—	Hilltop	basic rocks
Cg4	U. O. Hutton	Green	1947	480	Dr	85	6	—	Hilltop	Wissahickon (oligoclase)
Cg5	Misses Hutton	Easterday	1951	460	Dr	82	6	44	Draw on hillside	do
Cg6	Archie Gartrell	—	1890	450	Dug	30	48	—	Hillside	Sykesville
Cg7	Franklin Casdell	—	1900	480	Dug	16	36	—	Hillside	do
Cg8	F. E. Kruhm	—	1950	520	Dr	39	6	—	Hilltop	do
Cg9	Norman Mullinix	—	1951	480	Dr	30–40	6	—	Hillside	do
Cg10	R. E. Keister	Greene	1950	420	Dr	54	6	28	Valley	basic rocks
Cg11	George P. Kimmel	do	1947	460	Dr	98	8	36	Valleyside	Contact-basic rocks with Sykesville
Cg12	Elbin Leishear	do	1943	420	Dr	87.5	6	—	Hillside	basic rocks
Cg13	D. C. Hottel	—	1750	360	Dug	—	48	—	Hillside	Sykesville
Cg14	Do	D. Brown	1942	380	Dr	60	6	—	Hilltop	do
Cg15	Harry Musgrave	E. Brown	1947	450	Dr	60	6	28	Hilltop	do
Cg16	L. Showell	—	—	470	Dr	83	4	—	Draw on valleyside	do
Cg17	Mr. Howes	—	—	380	Dr	37	—	—	Valley	do

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
—	—	—	—	—	—	—	—, E	D	—	See chemical analysis.
8.08	Dec. 29, 1952	—	—	—	—	—	N	D	—	Water-level observation well.
—	—	—	—	—	—	—	J, E	D, F	—	Adequate supply. Well dug to rock.
9.54	Oct. 2, 1952	—	—	—	—	—	B, H	D	—	
—	—	—	—	—	—	—	J, E	D	—	
—	—	—	—	—	—	—	J, E	D	—	Owner reports considerable iron in water.
31.62	Oct. 2, 1952	—	—	—	—	—	C, E	D	—	Deepened dug well.
30[a]	June 15, 1951	98[a]	5	June 15, 1951	—	less than 0.1	—	D	—	See well log.
—	—	—	12	July 24, 1951	0.5	—	—, E	D	—	Water turbid.
29.44	Oct. 17, 1952	—	—	—	—	—	C, H	D	53.8	Adequate supply. See chemical analysis.
27.60	Dec. 16, 1952									
—	—	—	—	—	—	—	—, E	D	—	No hard rock encountered.
—	—	—	—	—	—	—	C, E	D	—	Adequate supply; never dry.
44[a]	1951	—	—	—	—	—	—, E	D, F	—	Adequate supply.
27.00	Oct. 24, 1952	—	—	—	—	—	J, E	D, F	—	Pumped 24 hours continuously at times.
20[a]	Nov. 7, 1947	45[a]	10	Nov. 7, 1947	0.5	0.4	C, E	D	—	
29.50	Oct. 30, 1952	—	—	—	—	—	C, H	N	—	Abandoned because of inadequate supply.
35.22	Oct. 24, 1952	—	—	—	—	—	C, E	D, F	—	Supply adequate.
—	—	—	—	—	—	—	C, H	D	—	
50[a]	Nov. 4, 1946	60[a]	10	Nov. 4, 1946	1	1	J, E	D	—	See well log.
14.6	Sept. 25, 1952	—	5	—	—	—	T, E	S	—	
31.2	Sept. 25, 1952	—	4	July 1952	48	1.3	J, E	D, F	—	Reported draw down 4 feet in 48 hours pumping 4 gpm.
35[a]	Aug. 26, 1951	60[a]	8	Aug. 26, 1951	—	0.3	J, E	D	—	
14.17	Sept. 26, 1952	—	—	—	—	—	J, E	D, F	—	
8.51	Sept. 26, 1952	—	—	—	—	—	J, E	D	—	
14.62	Sept. 26, 1952	—	—	—	—	—	J, E	D	—	
—	—	—	—	—	—	—	J, E	D	—	
10[a]	Aug. 1, 1950	20[a]	15	Aug. 1, 1950	0.5	1.5	J, E	D	—	See well log.
12[a]	June 13, 1947	30[a]	30	June 13, 1947	0.5	1.6	J, E	D	—	Do.
10.12	Sept. 26, 1952	—	—	—	—	—	J, E	D	—	
—	—	—	—	—	—	—	C, E	D, F	—	
11.11	Sept. 29, 1952	—	—	—	—	—	C, H	S	—	
35[a]	Mar. 12, 1947	—	8	Mar. 12, 1947	—	—	J, E	D	—	See chemical analysis. See well log.
29.94	Sept. 29, 1952									
—	—	—	—	—	—	—	J, E	D	—	See chemical analysis.
—	—	—	—	—	—	—	—, E	D	—	Do.

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Cg18	R. R. Heckman	—	—	400	Spring	—	—	—	Valley	Sykesville
Cg19	L. Showell	—	—	460	Spring	—	—	—	Draw on hillside	do
Da1	Raymond Jordan	—	1948	200	Dr	40	6	—	Valley flat	Pleistocene and Recent deposits
Db1	Selby Bros.	Stottlemyer	1946	410	Dr	62	6	40	Upland flat	New Oxford
Db2	Helen Keifer	do	1951	290	Dr	150	6	44	Hilltop	do
Db3	C. C. Wells	do	1951	380	Dr	110	6	97	Hillside	do
Db4	J. W. Kimmerling	Hilton	1952	360	Dr	76	6	24	Upland flat	do
Db5	Board of Education	—	1932	400	Dr	175	6	—	Upland flat	do
Db6	Do	Haines	1952	410	Dr	175	8	38	Upland flat	do
Db7	Do	do	1952	410	Dr	150	8	20	Upland flat	do
Db8	Harry Seigel	Hilton	1949	360	Dr	165	6	22	Hilltop	do
Db9	Sadie Palmer	Palmer	1934	300	Dug	11.5	48	—	Hillside	do
Db10	Mr. Yeager	—	—		Dr	76	6	—	Hilltop	do
Db11	M. Smith	—	1935	340	Dr	—	6	—	Hilltop	do
Db12	Richard W. Allnutt	Hilton	1949	350	Dr	81	6	32	Hillside	do
Db13	Thomas Corcoran	Green	1947	310	Dr	231	6	100	Hilltop	do
Db14	R. E. Sydner	—	Old	290	Dug	68	36	—	Upland flat	do
Dc1	J. D. Byrd	—	1920–25	340	Dr	110	6	—	Upland flat	do
Dc2	C. E. Roberts	Hilton	1949	320	Dr	130	6	50	Hilltop	do
Dc3	A. G. Rolfe	do	1952	410	Dr	70	6	22	Valleyside	Contact-New Oxford and Ijamsville phyllite

Continued

Water level (feet below land surface)			Yield							
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)	Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
—	—	—	20±	Dec. 29, 1952	—	—	C, E	D	51.7	Water treated with marble chips to reduce corrosion. See chemical analysis. Concrete collecting chamber.
—	—	—	2–3	Dec. 29, 1952	—	—	N	F	—	See chemical analysis. Concrete collecting and storage chambers.
13.82	May 16, 1952	—	—	—	—	—	C, H	D	53	On Potomac River valley terrace. See chemical analysis.
3[a]	Mar. 5, 1946	60[a]	5	Mar. 5, 1946	1	less than 0.1	C, E	C	58	See chemical analysis.
8.14	May 22, 1952									
45[a]	July 22, 1951	135[a]	3	July 22, 1951	1	less than 0.1	J, E	D	—	See well log.
35[a]	Apr. 7, 1951	70[a]	20	Apr. 7, 1951	1	0.6	NI	D	—	Do.
21[a]	July 28, 1952	63[a]	8	July 28, 1952	1	0.2	C, E	D	—	
—	—	—	6–9	1934	—	—	J, E	S	—	Poolesville school. Supply adequate (500 students). Water reported hard and contaminated; chlorinated.
10[a]	Oct. 1952	115[a]	12.5	Oct. 1952	24	0.1	NI	S	—	Poolesville school. Turbine pump to be installed. See well log.
18.89	Nov. 13, 1952									
25[a]	Oct. 1952	140[a]	3	Oct. 1952	24	less than 0.1	NI	S	—	Poolesville school. Well produced 10 gpm for 12 hours and then gradually decreased to 3 gpm. Turbine pump to be installed. See well log.
22[a]	Sept. 23, 1949	120[a]	10	Sept. 23, 1949	5	0.1	C, E	D	—	Well fills 30,000 gallon swimming pool in 3 days of intermittent pumping.
—	—	—	—	—	—	—	S, H	D	—	Dug during drought. Adequate supply.
22.29	Nov. 13, 1952	—	—	—	—	—	C, E	D, F	—	Water reported "oily" at times.
20[a]	Nov. 1, 1952	—	—	—	—	—	J, E	D, F	—	Fills 500 gallon tank in 20 minutes.
28[a]	May 10, 1949	56[a]	8	May 10, 1949	1	0.3	J, E	D	—	Water turbid. See well log.
20[a]	1948	—	20	1948	—	—	C, E	D, F	—	
24.61	Nov. 13, 1952	—	—	—	—	—	B, H	D	—	
3.23	Dec. 29, 1952	—	—	—	—	—	C, H	D	—	Water-level observation well. See chemical analysis.
40[a]	Oct. 30, 1949	80[a]	7	Oct. 30, 1949	2	0.2	C, E	D	—	See well log.
22[a]	June 20, 1952	28[a]	20	June 20, 1952	2	3.3	C, E	D	—	Three dry holes, 30, 55, and 205 feet deep, were drilled on a hill to the west. See well log and chemical analysis. Drilled in fault zone.
20.26	Nov. 4, 1952									

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Dc4	A. G. Rolfe	—	1940	370	Dr	120	6	—	Valley flat	New Oxford
Dc5	County Highway Department	—	1925	480	Dr	90	6	—	Hillside	Ijamsville phyllite
Dc6	Poolesville Methodist Church	Wooten	1900	400	Dr	72	6	—	Upland flat	New Oxford
Dc7	E. J. Preston	Hilton	1951	360	Dr	135	6	28	Hillside	do
Dc8	C. L. Allnutt	D. Brown	1949	290	Dr	203	6	—	Hillside	do
Dc9	M. M. Gillian	Hilton	1930	370	Dr	136	6	—	Upland flat	do
Dc10	F. M. Campbell	—	old	370	Dug	30	48	—	Upland flat	do
Dc11	T. H. Clements	D. Brown	1940	330	Dr	97	6	—	Hillside	do
Dc12	Charles Mathews	—	1910	310	Dr	136	6	—	Hilltop	do
Dc13	Lewis Allnutt	Hilton	1948	310	Dr	137	6	—	Hillside	do
Dd1	Alfred W. Spates	D. Brown	1949	360	Dr	139	6	10	Hilltop	Wissahickon (albite)
Dd2	Harry Lloyd	do	1949	360	Dr	90	6	—	Hillside	do
Dd3	W. F. Metz	do	1950	440	Dr	65	6	40	Valleyside	Ijamsville phyllite
Dd4	J. McDonald	—	Old	410	Dug-Dr	90	48–6	—	Upland flat	Wissahickon (albite)
Dd5	Fred Curtis	Green	1945	430	Dr	—	6	—	Hillside	do
Dd6	J. W. Kitterman	do	1940	280	Dr	—	6	—	Valleyside	do
Dd7	S. A. Green	—	Old	440	Dug	67	48	—	Hillside	do
Dd8	W. L. Smith	—	1850	440	Dug	45	48	—	Hillside	do
Dd9	Lewis Morris	Stottlemyer	1952	420	Dr	71	6	—	Hillside	do
Dd10	J. U. Leaman	D. Brown	1944	430	Dr	50	6	—	Valleyside	do
Dd11	Thomas Darby	Hilton	1930	340	Dr	106	6	—	Hillside	do
Dd12	Irene Branison	—	1880	350	Dug	30	36	—	Hillside	do
Dd13	Melvin Savage	D. Brown	1951	430	Dr	100−	6	—	Hillside	do
Dd14	James Lambert	—	1922	480	Dr	62.7	6	—	Hilltop	diabase (Triassic)
Dd15	W. Burriss	E. Brown	—	430	Dr	80	6	—	Upland flat	Wissahickon (albite)
Dd16	A. L. Kirby	Hilton	1951	360	Dr	57	6	31	Hillside	do
Dd17	Nelva Allnutt	do	1952	390	Dr	125	6	40	Hillside	do
Dd18	W. K. Foster	—	Old	380	Dr	47.7	6	12	Hillside	do
De1	Washington Suburban Sanitary Commission	E. Brown	1928	460	Dr	81	6	18+	Upland flat	do
De2	Gaithersburg Ice Co.	Green	1946	510	Dr	155	8	50	Upland flat	do
De3	Town of Rockville	Columbia Pump and Well Co.	1949	460	Dr	362	8	87	Hilltop	do
De4	Nathan Jones	Green	1946	530	Dr	87	6	60	Hilltop	do

Continued

Water level (feet below land surface)			Yield							
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)	Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
40[a]	Oct. 30, 1949	—	—	—	—	—	C, E	D, F	—	At least 500 gallons per day is pumped.
—	—	—	—	—	—	—	C, H	D	—	Formerly a school well.
—	—	—	—	—	—	—	N	N	—	Well now used to receive waste water from sinks.
42[a]	Dec. 17, 1951	75[a]	15	Dec. 17, 1951	1	0.5	N	N	—	Drilled as an auxiliary supply and was not needed. See well log.
—	—	—	6	—	—	—	C, E	F	—	3 gpm obtained at 100 ft, 3 gpm. near 200 ft.
—	—	—	—	—	—	—	C, E	D, F	—	
15[a]	1952	—	—	—	—	—	C, E	D, F	—	Rock at 5 feet. Well dry only once.
—	—	—	8	—	—	—	C, E	D, F	—	Adequate supply.
—	—	—	—	—	—	—	C, E	D, F	—	Never goes dry.
—	—	—	20	—	—	—	C, E	D, F	—	Encountered gravel at 137 feet.
75[a]	May 26, 1949	—	3	May 26, 1949	0.5	—	C, E	D	—	See well log.
60[a]	May 16, 1949	—	3	May 16, 1949	—	—	C, E	D	—	
20[a]	1950	—	2.5	1950	—	—	J, E	D	—	Water and sand at 30 feet.
40.77	Oct. 17, 1952	—	—	—	—	—	J, E	D	—	Well went dry during 1930's and was deepened.
—	—	—	—	—	—	—	C, E	D	—	
—	—	—	—	—	—	—	J, E	D	—	
56[a]	1952	—	—	—	—	—	C, E	D	—	Adequate supply.
31[a]	Oct. 1952	—	—	—	—	—	J, E	D	—	Reported water from three fractures near bottom.
46[a]	Oct. 14, 1952	65[a]	20	Oct. 14, 1952	0.5	1.0	NI	D	—	
12[a]	1952	—	—	—	—	—	J, E	D, F	—	Rock very soft. Well drilled in 6 hours.
—	—	—	—	—	—	—	J, E	D	—	
18[a]	1952	—	—	—	—	—	C, E	D	—	Adequate supply.
—	—	—	—	—	—	—	J, E	D	—	Do.
54.08	Oct. 24, 1952	—	—	—	—	—	N	N	—	Abandoned school well.
55[a]	1934	—	5	1934	—	—	C, H	D	—	
16[a]	Oct. 5, 1951	32[a]	20	Oct. 5, 1951	1	1.3	J, E	D	—	See well log.
35[a]	Mar. 18, 1952	100[a]	2	Mar. 18, 1952	1	less than 0.1	C, E	D	—	Well pumped dry when lawn was watered. See well log.
39.89	Oct. 30, 1952	—	—	—	—	—	J, E	D	—	Adequate supply.
52.36	Dec. 4, 1947	—	50	1928	—	—	N	N	—	Gaithersburg. Owner's well no. 2. Water-level observation well. See well log.
35[a]	Jan. 29, 1946	50[a]	25	Jan. 29, 1946	—	1.6	T, E	C	55.5	See chemical analysis.
40[a]	Aug. 1949	240	50	Aug. 1949	8	0.2	N	N	—	Owners well no. 21; destroyed; replaced by well De20. See well log.
40[a]	Mar. 20, 1946	50[a]	8	Mar. 20, 1946	0.5	0.8	J, E	D	—	See well log.
38.82	Oct. 17, 1952									

TABLE 2—

Well number (Mont.)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
De5	Board of Education	—	1918	520	Dr	75	6	—	Upland flat	Wissahickon (albite)
De6	Do	Green	1949–50	520	Dr	—	6	—	Upland flat	do
De7	McGrew's Iron and Metal Co.	Easterday	1952	500	Dr	50	6	45	Upland flat	do
De8	William Dosh	—	Before 1930	450	Dr	53	6	—	Hilltop	do
De9	Do	E. Brown	Before 1930	430	Dr	76–79	—	—	Hilltop	do
De10	J. B. Diamond	—	Before 1935	440	Dr	90–100	6	—	Hilltop	do
De11	Mr. Selby	—	Before 1935	420	Dug	30	60	—	Draw on hillside	do
De12	William Mason	E. Brown	Before 1935	430	Dr	64	6	—	Upland flat	do
De13	Unknown	—	1925(?)	430	Dr	90(?)	6(?)	—	Hillside	do
De14	Tom Musser	Easterday	1952	430	Dr	53	6	42	Hilltop	do
De15	Do	do	1951	390	Dr	65	6	33	Valleyside	do
De16	George Mann	Hilton	1951	410	Dr	55	6	—	Hilltop	do
De17	Cecil C. Lowery	Easterday	1951	485	Dr	53	6	—	Hilltop	serpentine
De18	Sidney Mills	Hilton	1952	390	Dr	75	6	28	Hilltop	Wissahickon (albite)
De19	L. H. La Mott	Stottlemyer	1951	360	Dr	70	6	41	Hilltop	do
De20	Town of Rockville	Columbia Pump and Well Co.	1951	460	Dr	275	8	46	Hilltop	do
De21	Washington Suburban Sanitary Commission	—	1927	460	Dr	217	6	—	Upland flat	do
De22	Do	—	1928	460	Dr	70	6	—	Upland flat	do
De23	Do	—	1931	460	Dr	83.5	—	—	Upland flat	do
De24	Do	—	1931	460	Dr	92	—	—	Upland flat	do
De25	Do	—	1935	510	Dr	105	—	—	Upland flat	do
De26	Do	—	1935	450	Dr	120.2	8–6	58.6	Hillside	do
De27	Do	—	1935	450	Dr	138.6	6	40	Hillside	do
De28	Do	—	1936	450	Dr	103	8	57	Hillside	do

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
—	—	—	—	—	—	—	N	N	—	Washington Grove. Well destroyed.
25.40	Oct. 17, 1952	—	—	—	—	—	J, E	S	—	Washington Grove. Supplies about 50 students. Good yield reported.
8[a]	Feb. 18, 1952	50[a]	3	Feb. 18, 1952	—	less than 0.1	C, H	C	—	See well log.
9.61	Oct. 17, 1952									
32.7	Oct. 22, 1952	—	—	—	—	—	C, H	D	—	
60[a]	Before 1930	—	10	—	—	—	C, E	D	—	Water reported soft.
—	—	—	—	—	—	—	C, E	D, F	—	Good yield reported. Another well on property about 1500 ft. west of De10; no data.
22.19	Oct. 22, 1952	—	—	—	—	—	B, H	D	—	
31.85	Oct. 22, 1952	—	10	—	—	—	C, H	D	—	Water reported soft.
—	—	—	—	—	—	—	C, H	N	—	Water reported "rusty."
15[a]	Mar. 29, 1952	53[a]	5	Mar. 29, 1952	—	0.1	J, E	D	—	
32.84	Oct. 24, 1952									
30[a]	Nov. 10, 1951	65[a]	5	Nov. 10, 1951	—	0.1	J, E	D	—	
22[a]	June 29, 1951	45[a]	8	June 29, 1951	1	0.3	J, E	D	—	See well log.
21.18	Dec. 1, 1952									
30[a]	Nov. 1, 1951	50[a]	6	Nov. 1, 1951	—	0.3	—	D	—	See well log.
26[a]	Sept. 28, 1952	53[a]	6	Sept. 28, 1952	1	0.2	J, E	D	—	
26.35	Dec. 1, 1952									
35[a]	Apr. 20, 1951	50[a]	15	Apr. 20, 1951	0.5	1.0	C, E	D	—	Do.
21[a]	Aug. 10, 1951	200[a]	30	Aug. 10, 1951	16	0.2	T, E	P	—	Owner's well no. 21. Pumped at 100 gpm. for 3 hrs.; then yield decreased to 30 gpm. See chemical analysis.
31[a]	1927	—	8	1927	—	—	N	N	—	Gaithersburg. Owner's well no. 1(?). Destroyed.
18[a]	1928(?)	—	40	1929	—	—	—	N	—	Gaithersburg. Owner's well no. 3.
—	—	—	—	—	—	—	—	N	—	Gaithersburg. Owner's well no.4
—	—	—	50	1931(?)	—	—	—	N	—	Gaithersburg. Owner's well no. 5. See chemical analysis.
—	—	—	35	1935	23	—	—	N	—	Gaithersburg. Owner's well no. 6.
—	—	—	60	1935	11.5	—	—	N	—	Gaithersburg. Owner's well no. 8. See chemical analysis.
—	—	—	16	1935	24	—	N	N	—	Gaithersburg. Owner's well no. 9.
—	—	—	—	—	—	—	—	N	—	Gaitbersburg. Owner's well no. 10. See chemical analysis.

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
De 29	Washington Suburban Sanitary Commission	—	1936–37	450	Dr	103.5–125	8	46	Hillside	Wissahickon (albite)
De 30	Do	—	1943	510	Dr	177–220	8	60	Upland flat	do
De 31	Do	Washington Pump and Well Co.	1947	500	Dr	160	8	68.8	Hillside	do
De 32	Do	do	1948	500	Dr	309	8	57	Hillside	do
De 33	Do	Columbia Pump and Well Co.	1948	480	Dr	300	8	77	Hillside	do
De 34	Do	Green	1942	490	Dr	19	—	—	Hillside	do
De 35	Do	do	1942	520	Dr	68	—	—	Upland flat	serpentine
De 36	Bowman Bros.	—	Before 1924	530	Dr	60	6	—	Upland flat	Wissahickon (albite)
Df 1	Town of Rockville	Miller-Fisher Bros.	1928	400	Dr	225	10	—	Valley	Wissahickon (albite)
Df 2	Do	do	—	400	Dr	219	8	—	Valley	do
Df 3	Do	—	—	425	Dr	283	8	—	Hillside	do
Df 4	Do	—	1930	415	Dr	154	8	—	Upland flat	do
Df 5	Do	—	—	415	Dr	108	8	—	Upland flat	do
Df 6	Gus Bell	—	—	445	Dr	78	6	—	Hillside	do
Df 7	Presbyterian Manse	—	—	470	Dug	36	48±	—	Hillside	do
Df 8	Town of Rockville	Greene	1949	455	Dr	105	8	60	Hillside	do
Df 9	John Fraley	Easterday	1951	390	Dr	60	6	43	Hilltop	Sykesville
Df 10	G. F. Harting	Green	1950	415	Dr	143	6	60	Upland flat	do
Df 11	Paul M. Fye	—	1930	490	Dr	75	6	—	Upland flat	do
Df 12	Board of Education	—	1925	480	Dr	80	6	—	Hillside	Wissahickon (albite)
Df 13	Do	—	1922	540	Dr	65	6	—	Hillside	serpentine
Df 14	Edgar B. Worley	Green	1945	440	Dr	92	6	22	Hilltop	Wissahickon (albite)
Df 15	J. H. Edens	—	1900±	500	Dug	47	24	—	Hillside	do
Df 16	Washington Gas Light Co.	Craver and Jenkins	1952	450	Dr	134	8	39.2	Hillside	do

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
—	—	—	—	—	—	—	—	N	—	Gaithersburg. Owner's well no. 11. See chemical analysis.
—	—	94[a]	38	1943	—	—	—	N	—	Gaithersburg. Owner's well no. 12.
21[a]	Oct. 23, 1947	140[a]	13	Oct. 23, 1947	24	0.1	—	N	—	Gaithersburg. Owner's well no. 13 (or new well no. 1). Sealed. See well log.
21[a]	Jan. 30, 1948	200[a]	50	Jan. 30, 1948	72	0.3	T, E	N	—	Gaithersburg. Owner's well no. 14 (or new well no. 2). See well log and chemical analysis.
30[a]	May 21, 1948	200[a]	9	May 21, 1948	8	0.05	N	N	—	Gaithersburg. See well log.
—	—	—	0	1942	—	—	N	N	—	Gaithersburg. Rock at 5 ft. Drilling stopped at 19 ft. because of hard rock.
—	—	—	—	—	—	—	N	N	—	Washington Grove. Rock at 5 ft. Small amount of water at 20 ft.
43.4	Jan. 13, 1948	—	13	1924	5	—	N	N	—	Originally 71 ft. deep.
12[a]	1934	—	20	—	—	—	C, E	P	—	Owner's well no. 1. Depth of pump in well, 220 ft.
—	—	—	20	—	—	—	C, E	P	—	Owner's well no. 2. Depth of pump in well, 214 ft.
24[a]	1915	—	15	1915	—	—	N	N	—	Owner's well no. 3. Yielded 28 gpm. at first, 15 gpm. after 1 hour of pumping. Covered by concrete slab. See well log.
—	—	—	30	—	—	—	C, E	P	—	Owner's well no. 7. Depth of pump in well, 149 ft. See chemical analysis.
—	—	—	25	—	—	—	T, E	P	—	Owner's well no. 8. Depth of pump in well, 103 ft.
10.5	June 8, 1949	—	—	—	—	—	N	N	—	
25.0	June 8, 1949	—	—	—	—	—	N	N	—	
5[a]	March 1949	95[a]	30	March 1949	48	0.3	N	N	—	Abandoned because water muddy. See well log.
30[a]	Oct. 27, 1951	60[a]	7	Oct. 27, 1951	—	0.2	—	D	—	Water reported soft.
22.68	Sept. 29, 1952									
20[a]	March 1950	140[a]	4	March 1950	1	less than 0.1	J, E	D	—	Water reported fairly soft. See well log.
15.98	Sept, 29. 1952									
—	—	—	—	—	—	—	C, E	D	—	Water reported fairly hard.
17.21	Oct. 15, 1952	—	—	—	—	—	C, —	N	—	Abandoned school.
28.35	Oct. 17, 1952	—	—	—	—	—	C, H	N	—	Do.
25[a]	Nov. 1, 1945	35[a]	10	Nov. 1, 1945	1	1.0	—	D	—	See well log.
40.98	Oct. 17, 1952	—	—	—	—	—	B, H	D	—	
15[a]	Jan. 9, 1952	33[a]	25	Jan. 9, 1952	24	1.4	T, E	C	—	See well log and chemical analysis. Water encountered at 56, 85, and 135 ft.

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Df 17	Maloney Concrete Co.	Hilton	1952	455	Dr	118	6	54	Upland flat	Wissahickon (albite)
Df 18	Lofstrand Co.	do	—	425	Dr	—	6	—	Upland flat	do
Df 19	Do	do	1950	425	Dr	67	6	60	Upland flat	do
Df 20	Do	do	1952	425	Dr	83	6	41	Upland flat	do
Df 21	L. Bennett	Easterday	1952	450	Dr	67	6	30	Hillside	do
Df 22	H. L. Olson	do	1952	450	Dr	89	6	21	Hilltop	do
Df 23	Town of Rockville	—	1948±	460	Dr	—	8	—	Hilltop	do
Df 24	Do	Columbia Pump and Well Co.	1950	465	Dr	395	8	92	Upland flat	do
Df 25	Do	do	1951	445	Dr	300	8	85	Hillside	do
Df 26	Do	do	1952	440	Dr	300	8	63	Hillside	do
Df 27	Do	—	1952	410	Dr	255	8	—	Valleyside	do
Dg 1	Board of Education	E. Brown	1951	470	Dr	140	8	68	Hilltop	Wissahickon (oligoclase)
Dg 2	Mr. Turner	—	1924	460	Dr	95	6	—	Hillside	do
Dg 3	Do	—	1947	460	Dr	90	6	—	Hillside	do
Dg 4	Board of Education	—	1932	490	Dr	175	6	—	Hillside	do
Dg 5	Do	Washington Pump and Well Co.	1952	500	Dr	252	10	54	Hillside	do
Dg 6	R. L. Benson	W. B. Hilton	1929	470	Dr	96	6	81	Hillside	do
Dg 7	Stanley M. Brown	Green	1935	550	Dr	65	6	65	Hillside	basic rocks
Dg 8	G. F. L. Steifel	Derflinger	1948	520	Dr	150	6	84	Hillside	Wissahickon (oligoclase)
Dg 9	Raymond G. Young	Greene	1951	375	Dr	101	6	56	Hillside	do
Dg 10	R. B. Thomas, Jr.	do	1938	505	Dr	72	6	—	Hillside	do
Dg 11	John E. Harr	—	1952	490	Dr	72	6	—	Upland flat	basic rocks
Dg 12	Frank Wilkinson	D. Brown	1952	520	Dr	100	6	—	Hillside	do
Dg 13	Olney Inn	Hilton	1926	560	Dr	140	6	—	Upland flat	do
Dg 14	Do	do	1930	560	Dr	135	6	—	Upland flat	do
Dg 15	E. W. Whipp	E. Brown	1949	540	Dr	92	6	76	Hillside	do
Dg 16	Do	do	1949	460	Dr	92	6	—	Hillside	Sykesville
Dg 17	W. C. Rymer	do	1951	490	Dr	60	6	24	Hillside	Wissahickon (oligoclase)
Dg 18	Ray Olson	E. Brown	1951	480	Dr	100	6	40	Hilltop	do
Dg 19	Do	—	Old	480	Dug	—	48	—	Hilltop	do
Dg 20	Francis X. Krogman	Derflinger	1948	430	Dr	87	6	20	Hilltop	basic rocks

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
26[a]	Aug. 24, 1952	78[a]	30	Aug. 24, 1952	4	0.6	T, E	C	—	
—	—	—	10	—	—	—	C, E	N	—	Owner's well no. 1. 40 ft. from well no. 2.
20[a]	May 19, 1950	45[a]	30	May 19, 1950	3	1.2	C, E	C	—	Owner's well no. 2. Water supply obtained from this well.
12[a]	Sept. 1, 1952	44[a]	40	Sept. 1, 1952	5	1.3	C, E	C	—	Standby well for fire protection.
40[a]	Aug. 30, 1952	67[a]	4	Aug. 30, 1952	—	0.2	J, E	D	—	See well log.
40[a]	July 5, 1952	72[a]	7	July 5, 1952	—	0.2	J, E	D	—	
—	—	—	—	—	—	—	T, E	P	—	Owner's well no. 20. See chemical analysis.
15[a]	Nov. 1, 1950	170[a]	87	Nov. 1, 1950	8	0.6	T, E	P	—	Owner's well no. 24. See well log.
—	—	—	50	1951	—	—	T, E	P	—	Owner's well no. 25.
35[a]	Apr. 21, 1952	150[a]	50	Apr. 21, 1952	8	0.4	T, E	P	—	Owner's well no. 27. See well log.
—	—	—	60–70	1952	—	—	N	P	—	
28[a]	Apr.2, 1951	43[a]	25	Apr. 2, 1951	12	1.7	J, E	S	—	
—	—	—	—	—	—	—	N	N	—	Abandoned because water muddy.
7.99	Sept. 25, 1952	—	4+	1952	—	—	J, E	C	—	Drilled 6 ft. north of Mont-Dg 2.
—	—	—	—	—	—	—	T, E	S	—	Sherwood High School.
12[a] 10.68	Aug. 20, 1952 Sept. 25, 1952	180[a]	30	Aug. 20, 1952	8	0.2	NI	S	—	Sherwood High School. See well log.
—	—	—	2.5	—	—	—	J, E	D	—	Water reported to occur in quartz.
6[a]	1935	—	—	—	—	—	J, E	D	—	When driller struck "flint rock" water rose nearly to land surface.
31[a]	Aug. 13, 1947	140[a]	2.5	Aug. 13, 1947	3	less than 0.1	J, E	D	—	Yielded 10 gpm. for 30 minutes and 2.5 gpm. for 2.5 hours. See well log.
50[a]	Dec. 1, 1951	75[a]	10	Dec. 1, 1951	1	0.4	J, E	D	—	
30[a]	Sept. 1952	—	—	—	—	—	J, E	D	—	
13.57	Sept. 29, 1952	—	—	—	—	—	NI	D	—	
—	—	—	7.5	Mar. 1952	—	—	J, E	D	—	
—	—	—	30±	1952	—	—	C, E	C	—	
—	—	—	30±	1952	—	—	C, E	C	—	Total yield from Mont-Dg 13 and 14 reported 60 gpm.
40[a]	Sept. 26, 1949	44[a]	12	Sept. 26, 1949	1	3.0	J, H	D	—	See well log.
16.54	Sept. 30, 1952	—	10	July 10, 1952	—	—	C, E	D	—	
18[a]	Dec. 1, 1951	60[a]	4	Dec. 1, 1951	0.5	0.1	J, E	D	—	Pumps dry in one-half hour when pumped at 4 gpm.
42[a]	Nov. 7, 1951	85[a]	8	Nov. 7, 1951	1	0.2	J, E	D	—	
20.93	Jan. 14, 1953	—	—	—	—	—	B, H	D	—	
15[a] 12.21	Sept. 24, 1948 Jan. 22, 1953	75[a]	6.5	Sept. 24, 1948	2	0.1	C, E	D	—	

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Dg 21	Board of Education	—	1922	480	Dr	75	6	—	Hillside	basic rocks
Dg 22	Alexander Hamilton	Hilton	1949	480	Dr	74	6	40	Hillside	Kensington granite gneiss
Dg 23	Raymond Schreiner	Green	1945	420	Dr	50	6	35	Valleyside	Kensington granite gneiss
Dg 24	Mr. Hewitt	Hilton	1933	435	Dr	91	6	62	Hilltop	do
Dg 25	L. J. Mancuso	E. Brown	1948	390	Dr	85	6	40	Valley	Wissahickon (oligoclase)
Dg 26	W. E. Weaver	Derflinger	1949	420	Dr	52	6	17	Hillside	Kensington granite gneiss
Dg 27	Paul Gottelman	do	1950	390	Dr	135	6	48	Hilltop	Wissahickon (oligoclase)
Dg 28	William Rossie	E. Brown	1947	480	Dr	110	6	65	Hillside	do
Dg 29	New Homes, Incorporated	Columbia Pump and Well Co.	1947	470	Dr	400	8	80	Hilltop	do
Dh 1	Mrs. John Ryan	—	Approx. 1850	500	Dug	40	48	37	Hillside	do
Dh 2	W. P. Hutton	Derflinger	1947	490	Dr	106	6	65	Valley flat	do
Dh 3	William Case	do	1947	450	Dr	126	6	85	Hillside	do
Dh 4	N. H. Kruhm	E. Brown	1875±	460	Dug	—	48	—	Hilltop	do
Dh 5	Fred Kruhm	do	1946	460	Dr	105	6	70	Hilltop	do
Dh 6	Board of Education	Greene	1949	490	Dr	126	6	83	Hillside	do
Dh 7	George F. Pontious	Hackey	1952	510	Dr	114	6	50	Hillside	do
Dh 8	William Hines	E. Brown	1951	540	Dr	100	6	—	Hillside	do
Dh 9	Samuel Pumphrey	Green	1945	390	Dr	85	6	55	Valleyside	do
Dh 10	C. A. Bryan	Easterday	1952	540	Dr	109	6	60	Hillside	do
Dh 11	Miss J. M. Hoffman	E. Brown	1949	550	Dr	120	6	60	Hillside	do
Dh 12	Nathan F. Beall	Derflinger	1949	450	Dr	106	6	72	Hilltop	Laurel gneiss (?)
Dh 13	W. H. Collier	Robinson	1895	400	Dr	65	5	—	Hilltop	Wissahickon (oligo clase)
Di 1	C. E. Lynn	Derflinger	1948	460	Dr	108	6	75+	Hillside	Laurel gneiss (?)
Di 2	Anthony Merendino	Hilton	1951	455	Dr	105	6	30	Hillside	do
Di 3	Robert M. McIn-turff	do	1951	450	Dr	65	6	63	Hillside	do
Di 4	E. W. Earp	—	—	400	Spring	—	—	—	Valley	Patuxent (?)

Continued

Water level (feet below land surface)			Yield							
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)	Specific capacity (g.p.m/ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
—	—	—	—	—	—	—	C, H	S	—	Norbeck school.
26[a]	Sept. 30, 1949	48[a]	10	Sept. 30, 1949	1	0.5	—	D	—	
17[a]	Oct. 25, 1945	25[a]	10	Oct. 25, 1945	1	1.2	J, E	D	—	
25.91	Jan. 22, 1953									
—	—	—	12	1933	—	—	—	D	—	See well log.
32[a]	Jan. 12, 1949	—	6	Jan. 12, 1949	—	—	—	D	—	Do.
12[a]	June 14, 1949	42[a]	4	June 14, 1949	0.5	0.1	J, E	D	—	Do.
16.19	Jan. 22, 1953									
28[a]	Apr. 8, 1950	126[a]	6	Apr. 8, 1950	1	0.1	—	D	—	
48[a]	June 17, 1949	—	6	June 17, 1949	—	—	—	D	—	
12[a]	May 31, 1947	200[a]	12	May 31, 1947	8	0.1	T, E	P	—	Water supply for 12 homes. See well log and chemical analysis.
31.82	Dec. 16, 1952	—	—	—	—	—	C, H	D	52	See chemical analysis.
38[a]	July 7, 1947	87[a]	8	July 7, 1947	1	0.2	J, E	D	—	2 gpm. obtained at 65 ft. See well log.
35[a]	Jan. 14, 1947	70[a]	5	Jan. 14, 1947	1	0.1	J, E	D	—	See well log. Pump setting, 110 ft.
42.51	Jan. 14, 1953	—	—	—	—	—	C, E	D, F	—	Dug 56 ft; deepened to 156 feet in 1940.
55[a]	Oct. 8, 1946	—	—	—	—	—	J, E	D	—	
15[a]	Apr. 2, 1949	126[a]	7	Apr. 2, 1949	0.5	0.1	C, H	S	—	Spencerville school. Pumped dry at 7 gpm. in 0.5 hour. See well log.
40[a]	Feb. 18, 1952	100[a]	5	Feb. 18, 1952	1	0.1	J, E	D	—	See well log.
—	—	—	15	Fall, 1951	—	—	J, E	C	—	Supplies small shoppng center.
8[a]	Dec. 3, 1945	10[a]	6	Dec. 3, 1945	1	3.0	C, E	D, F	—	
36[a]	June 20, 1952	80[a]	10	June 20, 1952	—	0.2	J, E	D	—	See well log.
55[a]	Jan. 15, 1949	—	2.5	Jan. 15, 1949	1	—	J, E	D	—	
36[a]	Sept. 17, 1949	96[a]	5.5	Sept. 17, 1949	1	0.1	—	D	—	Pumped 10 gpm. for 1 hour, then 5.5 gpm. for 0.5 hour. See well log.
60[a]	1934	—	5	—	—	—	—	D(?)	—	
33[a]	Aug. 5, 1948	95[a]	5	Aug. 5, 1948	1	0.1	C, E	D	—	15 gpm at 60–75 feet; cased off because water muddy. See well log.
16[a]	June 6, 1951	30[a]	18	June 6, 1951	1	1.3	J, E	D	—	Water reported muddy. See well log.
19[a]	July 28, 1951	33[a]	12	July 28, 1951	1	0.9	J, E	D	—	Water reported muddy.
—	—	—	5–10	Jan. 19, 1953	—	—	C, E	D	—	Spring at base of mottled brown and white clay. Concrete spring house.

TABLE 2—

Well number (Mont.)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Ec 1	J. F. Hunter	—	1948	200	Dr	84	6	48	Valleyside	New Oxford
Ec 2	William Cooley	Stottlemyer	1952	190	Dr	75	6	21	Valley flat	do
Ec 3	H. G. Stottlemyer	Hilton	1933	190	Dr	38	6	—	Valley flat	do
Ec 4	Joseph Miller	Stottlemyer	1948	200	Dr	95	6	31	Valleyside	do
Ec 5	H. Y. Pierpont	Hilton	1951	340	Dr	157	6	38	Hilltop	do
Ed 1	Morris Gurevich	—	1922	360	Dr	80	6	—	Hillside	Wissahickon (albite)
Ed 2	A. E. Benson	Hilton	1949	340	Dr	65	6	35	Hillside	do
Ed 3	Walter Smith	D. Brown	1951	360	Dr	86	6	—	Hillside	do
Ed 4	U. S. National Park Service	—	Old	190	Dr	36.1	6	—	Valley flat	Pleistocene and Recent deposits (?)
Ed 5	Ella Holehan	—	Old	200	Dug	25	60	—	Hillside	do
Ed 6	Geo. C. Vournas	—	—	410	Dr	—	8	—	Hillside	Wissahickon (albite)
Ee 1	Town of Rockville	Greene	1946	440	Dr	137	8	20	Hillside	do
Ee 2	Mr. Hayes	Hilton	1950	350	Dr	79	6	48	Hillside	do
Ee 3	Mr. Wiehle	—	—	460	Dr	65	6	—	Hilltop	do
Ee 4	Thomas McCrossin	Thomas	1949	350	Dr	80	6	50	Hillside	do
Ee 5	R. B. Warren	Easterday	1952	275	Dr	117	6	28	Hilltop	do
Ee 6	F. M. McConohie	Hilton	1949	360	Dr	86	6	55	Hillside	do
Ee 7	R. H. Norton	—	Old	380	Dr	100	6	—	Hillside	do
Ee 8	H. J. Clemons	Stottlemyer	1946	350	Dr	91	6	75.6	Hillside	do
Ee 9	R. F. Donoghue	Easterday	1952	270	Dr	90	6	60	Hilltop	do
Ee 10	J. W. Oyler	do	1952	410	Dr	73	6	30	Hillside	do
Ee 11	Mr. Dressler	Stottlemyer	1948	415	Dr	86	6	20	Hilltop	do
Ee 12	Ralph Scott	do	1948	400	Dr	94	6	75	Hilltop	do
Ee 13	Do	do	1948	400	Dr	86	6	45	Hillside	do
Ee 14	W. H. Price, Jr.	Easterday	1952	440	Dr	103	6	10	Hillside	serpentine
Ee 15	J. W. Lucas	do	1952	400	Dr	35	6	4	Hillside	do
Ee 16	Judson Beavers	Greene	1950	350	Dr	85	6	—	Hilltop	Wissahickon (albite)
Ee 17	J. H. Gilliker	Hilton	1952	370	Dr	110	6	81	Upland flat	do
Ee 18	H. R. Stiffler	—	1952	370	Dr	69	6	50	Hillside	do
Ee 19	J. S. Stein	—	Old	360	Dug	59	48	—	Hilltop	do

Continued

Water level (feet below land surface)			Yield							
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)	Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
33[a]	Mar. 20, 1948	84[a]	6	Mar. 20, 1948	1	0.1	J, E	D	—	See well log.
15[a]	Apr. 9, 1949	75[a]	2	Apr. 9, 1949	—	less than 0.1	J, E	D	—	Do.
—	—	—	4	—	—	—	—	D	—	Penetrated 8 to 10 ft. of gravel.
35[a]	Mar. 14, 1948	95[a]	2.5	Mar. 14, 1948	2	less than 0.1	C, E	D	—	
60[a]	Apr. 23, 1951	83[a]	12	Apr. 23, 1951	2	0.5	J, E	D	—	Water reported soft.
—	—	—	—	—	—	—	C, H	D	54	Well reported to go dry during summers. Water reported hard and irony. See chemical analysis.
20[a]	July 19, 1949	35[a]	10	July 19, 1949	1	0.7	J, E	D	—	Water reported hard. See well log.
—	—	—	—	—	—	—	NI	D	—	
6.99	Oct. 30, 1952	—	—	—	—	—	N	N	—	
9[a]	1952	—	—	—	—	—	C, H	D	—	Water reported hard and irony.
—	—	—	—	—	—	—	C, E	D, F	—	Supplies 2 houses, 2 barns. Pegmatite float near well.
23.60	Oct. 24, 1946	See Remarks	52	1946	49.5	0.5–	—	P	—	Owner's well no. 16. Pumped dry at 72 gpm. in 1946. Hard rock encountered at 123 ft. See chemical analysis.
28[a]	Apr. 18, 1950	44[a]	9	Apr. 18, 1950	2	0.6	—, E	D	—	See well log.
—	—	—	—	—	—	—	C, E	D	—	
40[a]	Aug. 1949	60[a]	—	—	0.75	—	—, E	D	—	Do.
70[a]	Sept. 18, 1952	80[a]	10	Sept 18, 1952	—	1.0	—	D	—	Do.
28[a]	Apr. 16, 1949	55[a]	20	Apr. 16, 1949	4	0.7	T, E	C	—	
—	—	—	—	—	—	—	C, H and E	D	—	
40[a]	Apr. 17, 1946	53[a]	20	Apr. 17, 1946	0.5	1.5	J, E	D	—	Reported water stains fixtures green. See well log.
30[a]	Feb. 23, 1952	90[a]	8	Feb. 23, 1952	—	0.1	—	D	—	
30[a]	Apr. 29, 1952	73[a]	8	Apr. 29, 1952	—	0.2	J, E	D	—	
20[a]	Apr. 3, 1948	86[a]	2	Apr. 3, 1948	0.5	0.1–	T, E	D	—	
—	—	—	8	Feb. 8, 1948	1	—	J, E	D	—	Water is pale blue. Field test: pH 6.0, hardness 28 ppm., Fe 0.0 to 0.1 ppm. See well log.
40[a]	Feb. 12, 1948	50[a]	20	Feb. 12, 1948	1	2.0	J, E	D	—	Stand-by well. Water reported cloudy.
20[a]	Aug. 18, 1952	103[a]	3	Aug. 18, 1952	—	less than 0.1	J, E	D	—	See well log.
14[a]	Oct. 24, 1952	35[a]	5	Oct. 24, 1952	—	0.2	S, E	D	—	
—	—	—	—	—	—	—	J, E	D	—	
30[a]	Aug. 16, 1952	68[a]	20	Aug. 16, 1952	2	0.5	J, E	D	—	
14[a]	July 12, 1952	69[a]	3	July 12, 1952	—	0.1–	NI	D	—	
50.79	Dec. 9, 1952	—	—	—	—	—	C, E	D	—	Well nearly dry in 1949.

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Ee 20	J. S. Stein	—	1948±	360	Dr	66	6	—	Hilltop	Wissahickon (albite)
Ee 21	Allen Elliot	—	1951	415	Dr	80	6	45	Hilltop	do
Ee 22	Mr. Copenhaver	—	Before 1940	400	Dug	25±	36±	—	Hillside	do
Ee 23	Town of Rockville	—	1947–48	420	Dr	—	8	—	Hillside	do
Ee 24	Do	—	1947–48	400	Dr	—	8	—	Hillside	do
Ee 25	Carlton Mills Development	—	—	450	Dr	—	—	—	Hilltop	serpentine
Ee 26	Do	—	—	440	Dr	—	6	—	Hillside	do
Ef 1	Town of Rockville	Greene	1946	415	Dr	162	8	45	Hillside	Wissahickon (albite)
Ef 2	Do	do	1946	365	Dr	108	8	—	Valley	do
Ef 3	Do	Hilton	Before 1935	430	Dr	253	8	—	Hillside	do
Ef 4	Do	do	1924	425	Dr	96	8(?)	—	Hillside	do
Ef 5	Do	Hilton(?)	Before 1935	420	Dr	135	6	—	Hillside	do
Ef 6	Do	—	1942	415	Dr	109	8	53±	Hillside	do
Ef 7	Do	—	—	425	Dr	113	8	55	Hillside	do
Ef 8	Do	—	—	425	Dr	101	8	—	Hillside	do
Ef 9	Do	—	1939	370	Dr	133.5	8	—	Valley	do
Ef 10	Do	—	1940	370	Dr	173	8	80±	Valley	do

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
48.30	Dec. 9, 1952	—	—	—	—	—	N	N	—	Reported driller lost tools in well.
25.72	Dec. 23, 1952	—	—	—	—	—	J, E	D	52	Water reported to have metallic taste and to stain fixtures blue. See chemical analysis.
—	—	—	—	—	—	—	—, E	D	—	Water reported to stain clothes and fixtures.
—	—	—	—	—	—	—	T, E	P	—	Owner's well no. 18. See chemical analysis.
—	—	—	—	—	—	—	T, E	P	—	Owner's well no. 19.
—	—	—	—	—	—	—	—, E	P	—	Supplies 11 homes. See chemical analysis.
—	—	—	—	—	—	—	C, E	P	—	Supplies 7 homes. See chemical analysis.
15[a]	Nov. 26, 1946	162[a]	29	Nov. 26, 1946	52	—	T, E	P	—	Owner's well no. 17. See well log and chemical analysis.
—	—	—	30	1946	—	—	T, E	P	—	Owner's well no. 15. Depth of pump in well, 103 ft. See chemical analysis.
—	—	—	6	—	—	—	N	N	—	Owner's well no. 6. Destroyed in 1934 because of poor yield.
—	—	—	15	—	—	—	N	N	—	Owner's well no. 4. Destroyed.
12[a]	1934	—	20	—	—	—	T, E	P	—	Owner's well no. 5. Depth of pump in well, 130 ft. Originally a dug well 30 ft. deep, water level. Reported 11 ft. below land surface. Reported to yield sandy water when not pumped continuously. See chemical analysis.
—	—	—	50 30	1944 1946	—	—	T, E	P	—	Owner's well no. 12. Depth of pump in well, 104 ft. See chemical analysis.
—	1953	60[a]	50–60	1946	—	—	T, E	P	—	Owner's well no. 13. Depth of pump in well, 108 ft. Pumped 24 hrs. per day. See chemical analysis.
55.30	Oct. 24, 1946	—	—	—	—	—	N	N	—	Owner's well no. 14. Water level observation well.
37.38	Oct. 24, 1946	—	60	1939	—	—	N	N	—	Owner's well no. 9. Reported yield declines when well Ef10 is pumped. Water-level observation well.
—	—	—	30	1946	—	—	T, E	P	54.5	Owner's well no. 10. Depth of pump in well, 168 ft. See chemical analysis.

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Ef 11	Town of Rockville	—	1940	370	Dr	101	8	—	Valley	Wissahickon (albite)
Ef 12	Willard King	Hilton	1950	270	Dr	62	6	31	Hilltop	do
Ef 13	Adm. Thomas	do	1949	290	Dr	114	6	85	Hillside	do
Ef 14	E. L. Burns	D. Brown	1952	310	Dr	90	6	40	Hilltop	do
Ef 15	S. Bodnarchuck	Hilton	1949	360	Dr	102	6	80	Upland flat	do
Ef 16	Mr. Morgan	Green	1945	350	Dr	120	6	85	Upland flat	do
Ef 17	Grover Lofton	do	1949	350	Dr	36	6	20	Valley side	Sykesville
Ef 18	Herbert S. Higdon	Hilton	1950	350	Dr	82	6	63	Hilltop	Wissahickon (albite)
Ef 19	Mr. Craig	Derflinger	1947	320	Dr	57	6	—	Hilltop	Contact-Kensington granite gneiss and Wissahickon (albite)
Ef 20	H. M. Queen	Hilton	1950	340	Dr	43	6	28	Hillside	basic rocks
Ef 21	Esso Service Station	Haines, Jr.	1951	400	Dr	100	6	60	Upland flat	Wissahickon (albite)
Ef 22	F. C. Mountuori	Derflinger	1947	400	Dr	115	6	101	Hillside	Wissahickon (oligoclase)
Ef 23	Eugene F. Blig	Green	1952	360	Dr	115	6	30	Upland flat	Wissahickon (albite)
Ef 24	John Richards	Stottlemyer	1950	270	Dr	45	6	33	Hillside	do
Ef 25	Mr. March	Hilton	1952	275	Dr	72	6	66	Draw on hillside	do
Ef 26	Town of Rockville	—	1939	370	Dr	137	8	—	Valley	do
Ef 27	Do	—	1939	370	Dr	115	8	—	Valley	do
Ef 28	Do	Washington Pump and Well Co.	1948	370	Dr	404	8	106	Hillside	do
Ef 29	Do	do	1948	330	Dr	56	6	28	Valley	Wissahickon (albite) and/or Sykesville
Ef 30	Do	do	1948	325	Dr	78	6	25	Valley	Contact-Wissahickon (albite) and Sykesville
Ef 31	Do	do	1949	330	Dr	108	6	38	Valley	Wissahickon (albite)
Ef 32	Do	Columbia Pump and Well Co.	1950	350	Dr	300	8	46	Hillside	Contact-Wissahickon (albite) and Sykesville
Ef 33	Do	—	—	340	Dr	250	8	—	Valley	Sykesville
Ef 34	Do	Greene	1949	420	Dr	38	—	—	Valleyside	Wissahickon (albite)

Continued

Water level (feet below land surface)			Yield							
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)	Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
—	—	—	13	1946	—	—	T, E	P	—	Owner's well no. 11. Depth of pump in well, 96 ft. See chemical analysis.
—	—	—	5	May 12, 1950	1	—	—, E	D	—	See well log.
50[a]	Feb. 5, 1949	70[a]	14	Feb. 5, 1949	1	0.7	J, E	D	—	Do.
50[a]	July 17, 1952	—	4(?)	July 17, 1952	0.5	—	J, E	D	—	
40[a]	June 18, 1949	65[a]	20	June 18, 1949	1	0.8	J, E	D	—	
20[a]	Nov. 1, 1945	50[a]	20	Nov. 1, 1945	1	0.7	—, E	D	—	See well log and chemical analysis.
26.50	Dec. 9, 1949	—	14(?)	—	—	—	J, E	D	—	
47[a]	May 8, 1950	58[a]	10	May 8, 1950	1	0.9	C, E	D	—	
25[a]	Feb. 6, 1947	30[a]	15	Feb. 6, 1947	1	3.0	J, E	D	—	See well log.
25[a]	June 3, 1950	30[a]	5	June 3, 1950	1	1	—	D	—	
10[a]	Apr. 20, 1951	30[a]	15	Apr. 20, 1951	1	0.8	J, E	C	—	See well log.
15[a]	Apr. 5, 1947	60[a]	6	Apr. 5, 1947	1	0.1	J, E	D	—	Do.
35	Dec. 11, 1952	50[a]	10	Dec. 11, 1952	0.5	0.7	NI	D	—	30 ft. of soft, weathered rock encountered.
32.49	Dec. 12, 1952									
11[a]	Nov. 17, 1950	30[a]	20	Nov. 17, 1950	3	1	—	D	—	
35[a]	1952	—	20	1952	—	—	NI	D	—	Hard rock encountered at 20 feet. Well to be deepened because of "muddy" water.
—	—	—	20	1939	—	—	N	N	—	Destroyed. Location approximate.
—	—	—	2—	1939	—	—	N	N	—	Destroyed. Location approximate. Pumped much mud.
—	Mar. 3, 1948	404[a]	1—	Mar. 3, 1948	—	—	N	N	—	Owner's Twinbrook well no. 1 (old). Water at approximately 90 ft. but cased off because unable to clear mica from water. Well destroyed. See well log and chemical analysis.
12[a]	Mar. 18, 1948	45[a]	60	Mar. 18, 1948	20	1.8	N	N	—	Owner's Twinbrook well no. 2 (old). Well destroyed.
9[a]	Apr. 2, 1948	67[a]	60	Apr. 2, 1948	20	1.0	T, E	P	—	Owner's Twinbrook well no. 2. See well log and chemical analysis.
3[a]	Mar. 8, 1949	40[a]	65	Mar. 8, 1949	24	1.8	T, E	P	—	Owner's Twinbrook well no. 1. See well log and chemical analysis.
15[a]	July 14, 1950	150[a]	63	July 14, 1950	8	0.5	T, E	P	—	Owner's Twinbrook well no. 3. See well log.
—	—	—	—	—	—	—	T, E	P	—	Owner's Twinbrook well no. 4.
30[a]	Jan. 15, 1949	—	—	—	—	—	N	N	—	Abandoned because of difficult drilling in hard black rock.

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Ef 35	Town of Rockvllle	Greene	1949	420	Dr	66	—	—	Valleyside	Wissahickon (albite)
Ef 36	Do	Columbia Pump and Well Co.	1949	430	Dr	350	8	96	Hilltop	do
Ef 37	Do	do	1952	350	Dr	255	8	25	Valley	do
Ef 38	Do	do	1951	370	Dr	275	8	60	Hillside	do
Ef 39	Do	do	1949	460	Dr	283	8	131	Hilltop	do
Ef 40	Do	do	1951	410	Dr	322	8	80	Hillside	do
Ef 41	Woodmont Country Club	Columbia Pump and Well Co.	1949	395	Dr	300	8	36.75	Hillside	do
Ef 42	Do	do	1949	390	Dr	297	8	25	Hillside	do
Ef 43	Do	—	—	380	Dr	—	8	—	Hillside	do
Ef 44	Waverly Sanatorium	—	Before 1934	350	Dr	105	6	—	Hilltop	Wissahickon (oligoclase)
Ef 45	Board of Education	—	1922	410	Dr	94+	6	—	Hilltop	Wissahickon (albite)
Ef 46	Rockville Ice Plant	Saunders	1913	410	Dr	147	8	80	Hillside	do
Ef 47	Do	Hilton	1928	410	Dr	110½	6	96	Hillside	do
Ef 48	Do	D. Brown	1936	410	Dr	140	6	—	Hillside	do
Ef 49	Do	Greene	1947	410	Dr	131	6	65	Hillside	do
Ef 50	All-Pure Spring Water Co.	—	—	360	Spring	—	—	—	Valleyside	do
Eg 1	Walter M. Brown	—	Before 1932	285	Dug	20		—	Valley side	Wissahickon (oligoclase)
Eg 2	Charles Hobbs	Haines	1948	450	Dr	120	6	93	Hillside	do
Eg 3	T. R. Cissell	—	Before 1900	430	Dug	70	—	—	Hilltop	do
Eg 4	W. A. Edelblut	Washington Pump and Well Co.	1947	350	Dr	125	6	50	Valley side	Kensington granite gneiss
Eg 5	Mrs. Arnett Martin	Hilton	1933	420	Dr	80	6	—	Upland flat	do

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
—	—	—	—	—	—	—	N	N	—	Abandoned because of difficult drilling
18[a]	Dec. 22, 1949	200[a]	100	Dec. 22, 1949	16	0.5	T, E	P	—	Owner's well no. 23. See well log and chemical analysis.
10[a]	June 13, 1952	46[a]	183	June 13, 1952	1	5	T, E	P	—	Owner's well no. 26. Capacity test: 133 gpm. for 8 hrs., then 183 gpm. for 1 hr.
10[a]	Mar. 1, 1951	200[a]	15	Mar. 1, 1951	8	0.08	N	N	—	Yielded 35 gpm. for 4 hrs., then decreasing to 15 gpm. Location approximate.
65[a]	Nov. 18, 1949	283[a]	2	Nov. 18, 1949	3	—	N	N	—	Owner's well no. 22. Destroyed. See well log.
15[a]	May 5, 1951	74[a]	100	May 5, 1951	16	1.7	T, E	P	—	Town of Rockville uses 80,000 gallons per day from this well and 3 ice plant wells. Formerly 92-96 ft. deep, 6 in. diameter. See chemical analysis.
30[a]	Mar. 11, 1949	250[a]	110	Mar. 11, 1949	8	0.5	T, E	C	—	First test 48 gpm. at 150 ft.; second test 98 gpm. at 250 ft.; third test 110 gpm. at 300 ft. Owner's well no. 1. See well log.
15[a]	July 1, 1949	220[a]	55	July 1, 1949	8	0.3	T, E	C	—	Owner's no. 2.
—	—	—	—	—	—	—	T, E	C	—	Owner's no. 3.
35[a]	1934	—	—	—	—	—	C, E	S	—	Report 0.5 ft. decline in water level in 7 hrs. capacity test. Water encountered in blue granite.
12.78	Feb. 20, 1953	—	—	—	—	—	J, E	S	—	Randolph school. Deepened by Green; total depth unknown.
5[a]	1918	—	3	1913-18	—	—	—	C, P	—	Principal supply encountered at 80 ft. See chemical analysis.
—	—	—	31	1928	—	—	—	C, P	—	Water encountered at contact of white "flint" and blue rock.
—	—	—	—	—	—	—	—	C, P	—	
60[a]	Aug. 11, 1947	80[a]	30	Aug. 11, 1947	0.5	1.5	—	C, P	—	
—	—	—	—	—	—	—	S, E	C	—	See chemical analysis.
14.02	Mar. 2, 1953	—	—	—	—	—	N	N	—	Water-level observation well, measured since 1932.
50[a]	Nov. 26, 1948	70[a]	10	Nov. 26, 1948	5	0.5	J, E	D	—	See well log.
—	—	—	—	—	—	—	C, E	C	—	
12[a]	Apr. 3, 1947	40[a]	20	Apr. 3, 1947	12	0.7	—	D	—	See well log.
12[a]	1934	—	21	—	—	—	N	N	—	Destroyed because water muddy; replaced by Eg 6.

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Eg 6	Mrs. Arnett Martin	Hilton	1933	420	Dr	70	6	40	Upland flat	Kensington granite gneiss
Eg 7	John Shumaker	Derflinger	1947	465	Dr	85	6	—	Hilltop	Wissahickon (oligoclase)
Eg 8	U. S. Army	Columbia Pump and Well Co.	1910	330	Dr	300	6	—	Hillside	Kensington granite gneiss
Eg 9	Do	Birch	1911-13	330	Dr	287	6	47	Hillside	do
Eg 10	Mrs. Louis Doebel	Hilton	1932	450	Dr	89	6	67	Hillside	Wissahickon (oligoclase)
Eg 11	Board of Education	—	1924	300	Dr	65	6	—	Upland flat	do
Eg 12	Town of Kensington	—	1915	300(?)	Dr	179	6	110	Hillside	do
Eg 13	Do	—	1915	300(?)	Dr	201	8	40	—	do
Eg 14	Do	—	Before 1918	300(?)	Dr	150	6	—	—	do
Eb 1	Board of Education	—	1927	415	Dr	95	6	—	Upland flat	do
Eh 2	R. W. Bonifant	Derflinger	1946	315	Dr	142	6	—	Hillside	Laurel gneiss
Eh 3	Do	—	Old	315	Dug	61	—	—	Hillside	Patuxent and Laurel gneiss
Eh 4	William Hewitt	Easterday	1951	420	Dr	93	6	55	Hillside	do
Eh 5	E. H. Winkler	do	1951	440	Dr	66	6	54	Hillside	do
Eh 6	R. R. Ayres	do	1952	430	Dr	138	6	45	Hillside	do
Eh 7	H. P. Libert	do	1951	450	Dr	96	6	44	Hillside	do
Eh 8	J. O. Bergom	Green	1948	365	Dr	110	6	10	Hillside	Laurel gneiss
Eh 9	R. L. Gill	—	1949	365	Dr	55	6	31	Hillside	do
Eh 10	Do	Washington Pump and Well Co.	1949	375	Dr	105	6	29	Hilltop	do
Eb 11	C. W. Morris	do	1950	300	Dr	166	6	29	Hillside	do
Eb 12	J. A. Ebbess	Smith	1950	330	Dr	40	6	16	Hillside	do
Eh 13	Mustafa Ebbess	—	1934	350	Dr	80	6	—	Hilltop	do
Eh 14	Malone	Greene	1946	310	Dr	49	6	42	Hillside	Wissahickon (oligoclase)
Eh 15	Feezer	do	1946	320	Dr	59	6	47	Hillside	do

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date	Duration of test (hours)					
—	—	—	—	—	—	—	C, E	D	—	Shallow well pump.
20[a]	June 28, 1947	70[a]	3.5	June 28, 1947	1	0.1	J, E	D	—	One gpm. obtained at 50 ft.; 2½ gpm. obtained at 85 ft. See well log.
—	—	—	11	1910	—	—	N	N	—	Owner's well no. 3. Plugged. Well no. 2, destroyed, was a few hundred feet east of well no. 3; was low in yield.
10[a]	1911–13	—	11	1911–13	—	—	N	N	—	Owner's well no. 1. Plugged.
7.47	Feb. 25, 1953	—	71	1932	—	—	C, E	D, F	—	Water at contact of white flint and granite.
—	—	—	—	—	—	—	N	N	—	Kensington school. Destroyed. Water of poor quality.
25[a]	1915	100[a]	42	1915	12	0.5	N(?)	N(?)	—	Owner's well no. 1 Locatinn approximate. See well log.
—	—	—	12	1915(?)	—	—	N(?)	N(?)	—	Owner's well no. 2. Reported "caved in" from 191–201 ft. Location approximate.
—	—	—	—	—	—	—	N(?)	N(?)	—	Owner's well no. 3. Location approximate.
—	—	—	—	—	—	—	J, E	S	—	Fairland school. See chemical analysis.
63[a]	Sept. 21, 1946	67[a]	8	Sept. 21, 1946	1	2.0	C, E	D	—	See well log.
—	—	—	—	—	—	—	N	N	—	Abandoned because taste "oily."
25[a]	Dec. 1951	31[a]	10	Dec. 1951	—	1.6	J, E	D	—	Originally drilled to 61 ft.; deepened to 91 ft.
30[a]	May 18, 1951	—	8	May 18, 1951	—	—	J, E	D	—	
36[a]	Sept. 30, 1952	—	—	—	—	—	NI	D	—	See well log.
35[a]	June 30, 1951	96[a]	8	June 30, 1951	—	0.1	—, E	D	—	
30[a]	Oct. 11, 1948	50[a]	15	Oct. 11, 1948	1	0.8	J, E	D	—	Water reported hard. Use spring for drinking. See well log.
18[a]	May 28, 1949	22[a]	30	May 28, 1949	2	7.5	J, E	D	—	Reported yield maintained after casing carried below the gravel in the overburden. See well log.
—	—	—	—	—	7	—	J, E	D	—	Water obtained just below 30 ft.; yield increased with depth. Reported drilled in extremely hard granite below 29 ft. of soft material. See well log.
20[a]	Oct. 27, 1950	110[a]	7	Oct. 10, 1950	8	0.1	C, E	D	—	Pump column length, 150 ft.
13[a]	May 2, 1950	—	20	May 2, 1950	—	—	J, E	D	—	See well log.
—	—	—	—	—	—	—	J, E	D	—	Supplies fish pnnd. Yield repnrted good.
30[a]	Apr. 22, 1946	—	5	Apr. 22, 1946	0.5	—	N	N	—	Abandoned; now use W.S.S.C. water.
25[a]	Apr. 24, 1946	—	7	Apr. 24, 1946	0.5	—	N	N	—	Do.

TABLE 2—

Well number (Mont.)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Eh 16	Board of Education	—	1922	400	Dr	65	6	—	Hilltop	Wissahickon (oligoclase)
Eh 17	U. S. Navy	Columbia Pump and Well Co.	1945	350(?)	Dr	250	10-8	70 and 180	—	Laurel gneiss
Fe 1	A. M. Worsham	Hilton	1951	370	Dr	132	6	122	Hilltop	Wissahickon (albite)
Fe 2	Henry Kumm, Jr.	Green	1948	325	Dr	75	6	40	Hilltop	do
Fe 3	Geo. N. Wahaus	do	1952	320	Dr	68	6	30	Hilltop	do
Fe 4	Girl Scouts of America	Columbia Pump and Well Co.	1945	280	Dr	281	6	85	Hilltop	do
Fe 5	C. F. Jacobson	Stottlemyer	1946	270	Dr	61	6	42	Valley side	do
Fe 6	U. S. Navy-Carderock Testing Basin	Hoy	1938	150	Dr	402.5	6	—	Valley flat	do
Fe 7	Do	do	1938	150	Dr	171	8	—	Valley flat	do
Fe 8	Do	do	1938	155	Dr	86	6	—	Valley flat	do
Fe 9	Do	Washington Pump and Well Co.	1945	135	Dr	402	8	21	Valley flat	do
Ff 1	Burning Tree Country Club	Washington Pump and Well Co.	1949	250	Dr	300	8	66	Hillside	do
Ff 2	Do	—	1932	225	Dr	160	6 or 8	—	Draw on hillside	do
Ff 3	Do	—	Before 1850	250	Dug	40	48	—	Hilltop	do
Ff 4	Board of Education	—	1924	250	Dr	70	6	—	Hillside	gabbro
Ff 5	Do	—	1927	160	Dr	120	6	—	Hilltop	Wissahickon (albite)
Ff 6	Mr. Vartanoff	Washington Pump and Well Co.	1946	270	Dr	112	6	—	Hillside	basic rocks
Ff 7	William Hines	do	1946	270	Dr	65	6	50	Hillside	do
Ff 8	National Institute of Health	—	1922	340	Dr	220	6	200	Hillside	Wissahickon (oligoclase)
Ff 9	Do	Columbia Pump and Well Co.	1946	310	Dr	250	8	60	Hillside	do
Ff 10	Naval Medical Center	Washington Pump and Well Co.	1951	320	Dr	350	8	—	Hilltop	do
Ff 11	Do	do	1951	320	Dr	225	8	—	Hillside	do
Ff 12	Do	do	1951	290	Dr	275	8	—	Hillside	do
Ff 13	E. F. Nolman	Hilton	Before 1934	300(?)	Dr	102	6	101	—	Kensington granite gneiss
Ff 14	Unknown	Bee	Before 1934	300	Dr	66.3	6	—	Hilltop	Contact-gabbro and Sykesville
Ff 15	Village of Edgemoor (?)	—	1916 or earlier	350(?)	Dr	314	—	—	—	Wissahickon (oligoclase)(?)

Continued

Water level (feet below land surface)			Yield			Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	g.p.m.	Date	Duraton of test (hours)					
—	—	—	—	—	—	—	C, H	S	—	
70[a]	1945	240[a]	1.25	1945	12	0.01—	N	N	—	Naval Ordnance Laboratory. Well covered; location approximate.
50[a]	Oct. 11, 1951	65[a]	20	Oct. 11, 1951	2	1.3	—, E	D	—	
30[a]	Sept. 6, 1952	50[a]	7	Sept. 6, 1952	1	0.4	J, E	D	—	See well log.
30[a]	Sept. 15, 1952	50[a]	8	Sept. 15, 1952	1	0.4	J, E	D	—	
40[a]	Sept. 29, 1945	80[a]	20	Sept. 29, 1945	1	0.5	T, E	S	—	See well log and chemical analysis.
18[a]	Apr. 26, 1946	38[a]	20	Apr. 26, 1946	1	1.0	J, E	D	—	See well log.
33.83	Dec. 11, 1952									
—	—	180[a]	32	—	—	—	T, E	S	—	Only 2 gpm. until depth of of 402.5 ft. reached. See chemical analysis.
—	—	—	60	1938	—	—	T, E	S	—	Very little water until depth of 174 ft. reached.
—	—	—	5–7	1938	—	—	N	N	—	
25[a]	Feb. 6, 1945	120	120	Feb. 6, 1945	10	1.2	T, E	S	—	In another test, reported drawdown of 140 ft. pumping 90 gpm. for 18 hrs.
20[a]	May 26, 1949	195[a]	80	May 26, 1949	12	0.5	T, E	C, F	—	Reported yield decreases markedly during dry periods. Used principally for irrigation. See well log.
—	—	—	50	—	—	—	T, E	C	—	Used principally for drinking.
—	—	—	—	—	—	—	C, H	C	—	Used for drinking. Also have a dug well 60 ft. deep.
—	—	—	—	—	—	—	N	N	—	Destroyed.
—	—	—	—	—	—	—	N	N	—	Do.
24[a]	Feb. 4, 1946	—	10	Feb. 4, 1946	4	—	J, E	D	—	See well log.
23[a]	Jan. 25, 1946	40[a]	20	Jan. 25, 1946	4	1.2	J, E	D	—	
—	—	—	80	1946	—	—	T, E	S	—	See chemical analysis.
20[a]	Dec. 30, 1946	200[a]	100	Dec. 30, 1946	12	0.6	T, E and G	S	—	Pump setting, 220 ft.
—	—	—	—	—	—	—	T, E	N	—	Owner's well no. 1. Yields 26 gpm. for short periods.
13.96	Feb. 24, 1953	—	—	—	—	—	J, E	N	—	Owner's well no. 2. Yields water for short periods only.
19.46	Feb. 24, 1953	—	—	—	—	—	J, E	N	—	Owner's well no. 3. Yields water for short periods only.
—	—	—	18	—	—	—	N(?)	N(?)	—	Location approximate.
—	—	—	3	—	—	—	N	N	—	Former owner F. W. Page.
—	—	—	50	1916	96	—	N(?)	N(?)	—	Location approximate. See well log.

TABLE 2—

Well number (Mont-)	Owner or name	Driller	Date completed	Altitude (feet)	Type of well	Depth of well (feet)	Diameter of well (inches)	Length of casing (feet)	Topographic situation	Water-bearing formation
Fg 1	Hot Shoppes, Inc.	—	—	350	Dr	475	—	—	Hillside	Laurel gneiss
Fg 2	Chevy Chase Land Co.	—	1915 or earlier	330(?)	Dr	162	—	—	—	Wissahickon (oligoclase)
Fg 3	Do	—	1919 or earlier	330(?)	Dug	50-60	—	—	—	do
Fg 4	Do	—	1919	330(?)	Dr	156±	6	—	—	do
Fg 5	Mathew Dawson	Hilton	1932	300(?)	Dr	61	6	42		do
Fg 6	Henry Mactier	Columbia Pump and Well Co.	1904	300(?)	Dr	96	6	43		do
Fg 7	E. M. Ross	Saunders	1914	—	Dr	50	6	12	—	Laurel gneiss

Concluded

Water level (feet below land surface)			Yield		Duration of test (hours)	Specific capacity (g.p.m./ft.)	Pumping equipment	Use of water	Temperature (°F.)	Remarks
Static	Date	Pumping	(g.p.m.)	Date						
—	—	—	—	—	—	—	N	N	—	Very poor yield reported.
—	—	—	—	—	—	—	N(?)	N(?)	—	Location approximate.
—	—	—	6±	1919	—	—	N(?)	N(?)	—	Four other dug wells with same depth and yield. Locations approximate.
—	—	—	13	1919	—	—	N(?)	N(?)	—	Location approximate. About 22 wells drilled or dug for Chevy Chase Land Co., of which about 16 yielded enough water to be used; maximum total yield of about 56,000 gallons a day. Now served by Wash. Sub. Sanit. Commission
—	—	—	15	—	—	—	N(?)	N(?)	—	Location approximate.
12[a]	1904	28[a]	18	1904	—	1.1	N(?)	N(?)	—	Location approximate. Principal water-bearing zones at 6 and 63 ft. See well log.
15[a]	1914–18	—	4	1914–18	—	—	N(?)	N(?)	—	One-half mile northeast of Silver Spring. Exact location not known.

TABLE 3

Drillers' Logs of Wells in Howard County

	Thickness (feet)	Depth (feet)
How-Ab 1		
Ijamsville phyllite:		
Clay	50	50
Slate	50	100
How-Ba 1		
Ijamsville phyllite:		
Topsoil	4	4
Slate, blue	86	90
How-Bb 1		
Ijamsville phyllite:		
Topsoil	4	4
Shale, yellow	100	104
How-Bc 1		
Ijamsville phyllite:		
Topsoil	4	4
Shale, yellow	76	80
Slate, blue	26	106
How-Bc 2		
Ijamsville phyllite:		
Clay	45	45
Rock, gray	57	102
How-Bc 4		
Sykesville formation:		
Soil, brown	3	3
Rock, gray, blue, and green, soft	17	20
Rock, black, gray, and white (water at 45 feet)	95	115
How-Bd 2		
Cockeysville marble:		
Earth, loamy	3	3
Clay, sandy	11	14
Marble, hard (water at 45, 122, 144, 191, and 202 feet)	188	202
How-Bd 3		
Cockeysville marble:		
Earth, loamy	4	4
Clay, sandy	11	15
Marble, trace of mica (water at 34, 105, 168, and 192 feet)	188	203
How-Bd 5		
Wissahickon formation (oligoclase):		
Sand	30	30
Slate	20	50

TABLE 3—*Continued*

	Thickness (feet)	Depth (feet)
How-Bd 7		
Wissachickon formation (oligoclase):		
Gravel and sand	25	25
Sand	31	56
Rock	24	80
How-Bd 8		
Setters formation and/or pegmatite:		
Sand	30	30
Mica rock	55	85
Granite	39	124
How-Bd 13		
Baltimore gneiss:		
Soil and weathered rock	20	20
Rock	30	50
How-Be 2		
Baltimore gneiss:		
Soil and weathered rock	30	30
Granite	25	55
How-Be 3		
Wissahickon formation (oligoclase):		
Gravel and sand (water at 30 feet)	25	25
Flint, mica	55	80
Mica	60	140
How-Be 4		
Wissahickon formation (oligoclase):		
Clay	45	45
Sandstone	33	78
How-Be 6		
Wissahickon formation (oligoclase):		
Clay, sandy	50	50
Granite	98	148
How-Be 7		
Baltimore gneiss and/or Wissahickon formation (oligoclase):		
Loam and mica	40	40
Rock, soft (water)	6.5	46.5
How-Be 17		
Wissahickon formation (oligoclase):		
Clay	10	10
Sand and gravel	62	72
Mica rock	24	96

TABLE 3—*Continued*

	Thickness (feet)	Depth (feet)
How-Bf 6		
Contact—Gabbro and Ellicott City granite:		
Clay, yellow	40	40
Clay, dark	10	50
Sandstone, dark (water)	10	60
How-Bf 10		
Wissahickon formation (oligoclase):		
Sand and gravel	30	30
Rock, hard	15	45
How-Bf 24		
Gabbro and/or Ellicott City granite:		
Clay, dark gray	10	10
Sandstone, dark gray	55	65
Sandstone, yellow	15	80
Sandstone, dark	3	83
How-Bf 27		
Gabbro:		
Clay	25	25
Gravel	15	40
Rock	27	67
How-Bf 31		
Wissahickon formation (oligoclase):		
Clay, micaceous, dark gray	20	20
Sandstone, dark gray	25	45
Stone, micaceous, gray	20	65
How-Cd 2		
Wissahickon formation (oligoclase):		
Sand and gravel	30	30
Rock, soft	15	45
Mica rock	45	90
How-Cd 4		
Baltimore gneiss:		
Clay and sand	16	16
Sandstone and boulders	24	40
How-Cd 6		
Wissahickon formation (oligoclase):		
Dirt and rock, shaly, rotten, red	18	18
Sand (water)	2	20
Shale, rotten, red	20	40
Stone, light brown, mica	20	60
Shale, rotten, green; sand, fine (water)	13	73

TABLE 3—*Continued*

	Thickness (feet)	Depth (feet)
Soapstone, rotten, blue	5	78
Shale, hard (water)	4	82
Stone, green, soft	4	86
Mica rock, green, soft	13	99
How-Cd 13		
Baltimore gneiss:		
Clay, red	10	10
Shale	35	45
Stone, gray	25	70
How-Ce 1		
Wissahickon formation (oligocase):		
Sand, coarse, with mica	5	5
Dirt and mica, light brown	7	12
Mica rock, rotten	13	25
Mica rock, light brown (water-bearing seams)	25	50
How-Cf 1		
Patuxent formation:		
Topsoil, and clay, yellow	14	14
Clay, yellow, and gravel	12	26
Soil, sandy, blue	2	28
Gabbro:		
Clay, dark blue	6	34
Clay, light blue	11	45
Rock, blue, hard	45	90
Rock, gray, soft	30	120
Rock, blue, soft (small crevice at 165 ft.)	45	165
Rock, gray, soft	30	195
Rock, black, soft (drilled 5 ft. per hour)	6	201
How-Cf 4		
Patuxent formation:		
Clay, mixed colors	18	18
Sand and clay	7	25
Sand and gravel, coarse	3	28
Clay, and sand, blue	2	30
Gabbro:		
Clay, blue	10	40
Rock, blue, soft	5	45
Seam of rock, blue	22	67
How-Cf 5		
Patuxent formation:		
Dirt, brown	5	5
Sand and clay, yellow (water at 25 feet)	20	25
Sand and clay, gray	5	30

TABLE 3—*Continued*

	Thickness (feet)	Depth (feet)
Patuxent formation and gabbro:		
Sand and clay, blue	10	40
Gabbro:		
Clay, and rock, blue, soft	3	43
Rock, light blue, soft	7	50
Rock, light blue, some black (water at 54 ft.)	4	54
Rock, blue	3	57
How-Cf 7		
Patuxent formation:		
Clay	20	20
Sand	35	55
Gravel and sand	41	96
Gabbro:		
Rock	46	142
How-Cf 8		
Patuxent formation:		
Sand, fine	30	30
Sand and gravel	35	65
Gabbro:		
Rock, very hard	53	118
How-Cf 9		
Patuxent formation:		
Clay, yellow	10	10
Sand and clay, yellow	6	16
Sand and gravel (water)	4	20
Patuxent formation and gabbro(?):		
Sand and clay, blue	12	32
Gabbro:		
Rock, soft, blue (water)	2	34
Rock, blue, seamed	14	48
Rock, blue and gray, seamed (water at 50 ft.)	27	75
How-Cf 10		
Patuxent formation:		
No record	10	10
Sandstone, brown, seamy	23	33
Gabbro and/or Relay quartz diorite:		
Rock, gray-blue, white seams	62	95
How-Cf 11		
Patuxent formation:		
Sand and clay, yellow	50	50
Patuxent formation(?) and gabbro(?):		
Silt	20	70
Gabbro(?):		
Sandstone, gray	5	75

TABLE 3—*Continued*

	Thickness (feet)	Depth (feet)
How-Cf 12		
Patuxent formation:		
Sand and clay	15	15
Clay and sand, yellow	15	30
Sand and silt, white	10	40
Sand, yellow (water)	5	45
Gabbro(?):		
Clay, gray	5	50
Sandstone, gray	20	70
How-Cf 13		
Patuxent formation:		
Clay	10	10
Gravel	15	25
Patuxent formation or gabbro:		
Clay, blue	40	65
Gabbro:		
Shale, blue	110	175
How-Cf 14		
Gabbro:		
Clay, yellow	10	10
Clay, brown, mica	20	30
Stone, mica	10	40
Stone, gray, soft	7	47
How-Cf 15		
Wissahickon formation (oligoclase):		
Clay	20	20
Sand	56	76
Rock	21	97
How-Cf 17		
Patuxent formation:		
Gravel	40	40
Gabbro:		
Rock, soft (water at 60 feet)	20	60
Mica rock, hard	25	85
How-Cf 18		
Patuxent formation:		
Gravel and sand	60	60
Gabbro:		
Rock	18	78
How-Cf 19		
Patuxent formation:		
Sand and clay	35	35

TABLE 3—*Continued*

	Thickness (feet)	Depth (feet)
Patuxent formation and/or gabbro:		
Sandstone	10	45
Gabbro:		
Granite	25	70
How-Cf 20		
Patuxent formation:		
Sand and clay	50	50
Patuxent formation and/or gabbro:		
Sandstone, soft	10	60
Gabbro:		
Granite and mica	30	90
How-Cf 23		
Patuxent formation:		
Sand and clay	20	20
Clay, yellow	35	55
Clay, dark	5	60
Sand	5	65
How-Cf 24		
Patuxent formation:		
Clay	20	20
Sand	44	64
Wissahickon formation (oligoclase):		
Mica rock	81	145
How-Cf 25		
Patuxent formation:		
Clay and sand, yellow	20	20
Gravel, fine, and clay	15	35
Patuxent formation and gabbro(?):		
Clay, blue; gravel, fine, and sand	10	45
Gabbro:		
Clay, blue, and rock, blue, rotten	13	58
Rock, blue, seamy	5	63
How-Cg 7		
Pleistocene and Recent deposits and/or Patuxent formation:		
Clay and sand	15	15
Patuxent formation:		
Clay, yellow; sand, fine	35	50
(Water)	5	55
How-Cg 9		
Gabbro:		
Clay, red	38	38
Granite, gray	87	125

TABLE 3—*Continued*

	Thickness (feet)	Depth (feet)
How-Cg 10		
Patuxent formation:		
Clay, yellow	5	5
Clay, red	5	10
Gravel, yellow	15	25
Sandstone, soft	4	29
How-Cg 11		
Patuxent formation:		
Clay, tough	50	50
Gabbro or Relay quartz diorite:		
Rock, green	100	150
How-Cg 13		
Patuxent formation:		
Gravel, yellow; clay, yellow and blue	30	30
Patuxent formation or gabbro:		
Sandstone	6	36
How-Cg 14		
Patuxent formation:		
Clay, yellow	45	45
Sand and clay	10	55
Sand, gray (water)	5	60
Sand and clay, yellow	5	65
Sand, yellow (water)	5	70
Sand (water)	5	75
How-Dd 3		
Wissahickon formation (oligoclase):		
Clay, red	15	15
Clay, yellow	15	30
Clay, gray, with mica	12	42
Mica rock, soft	24	66
How-De 2		
Patuxent formation:		
Clay, yellow	25	25
Gabbro:		
Shale	10	35
How-De 11		
Wissahickon formation (oligoclase):		
Clay, red	10	10
Sand and rock	32	42
Rock, blue and brown	27	69
Granite, blue and gray	14	83
Granite, gray	47	130

TABLE 3—*Continued*

	Thickness (feet)	Depth (feet)
How-De 12		
Wissahickon formation (oligoclase):		
Clay, red	2	2
Sand, brown	4	6
Granite, gray	408	414
How-De 13		
Patuxent formation:		
Clay, yellow	4	4
Clay and sand, yellow	4	8
Gravel, fine, and sand, yellow (water)	7	15
Clay, mixed	3	18
Gabbro:		
Rock, blue, soft (water at 22 and 38 feet)	20	38
Rock, blue-gray and white	8	46
Rock, blue (water at 65 feet)	19	65
Rock, blue-gray and white (water at 67 feet)	2	67
Rock, blue	13	80
(Seams—fractures or small veins—reported at 22, 38, 46, 51, 57, 61, 65, 67, 69, 72, 74, and 78 feet)		
How-De 14		
Patuxent formation:		
Sand, fine, gravel, clay, yellow	15	15
Sand and clay, yellow	3	18
Patuxent formation and gabbro:		
Sand and clay, blue	4	22
Gabbro:		
Rock, blue, soft, and clay	10	32
Rock, blue (water at 79 and 95 feet)	70	102
(Blue, gray, and white seams—small veins?—reported at 37, 47, 51, 54, 56, 61, 73, 78, 79, 80, 90, and 95 feet).		
How-De 15		
Wissahickon formation (oligoclase):		
Topsoil	2	2
Mica mud (running)	63	65
Mica shale, hard	7	72
Mica shale, soft, and mud (water)	4	76
Mica rock, hard, a little flint mixed	277	353
Rock, gray, hard	22	375
How-De 16		
Wissahickon formation (oligoclase):		
Topsoil, and mica, sandy	7	7
Mica schist, soft	43	50
Contact-Wissahickon formation (oligoclase) and pegmatite:		
Mica rock mixed with quartz, hard	11	61
Wissahickon formation (oligoclase):		
Mica schist, soft	1	62

TABLE 3—*Continued*

	Thickness (feet)	Depth (feet)
How-De 17		
Contact-Wissahickon formation (oligoclase) and pegmatite:		
Soil, sandy	10	10
Mica, sandy, and mud	5	15
Streaks quartz and mica, very soft	7	22
Rock, brown, hard	10	32
Rock, gray, and mica (crevice just below 42 ft.)	28	60
Mica rock, not very hard	40	100
How-De 18		
Contact-Wissahickon formation (oligoclase) and pegmatite:		
Soil, brown	8	8
Soil, sandy, red	10	18
Soil, sandy, brown	12	30
Mud and mica, brown, soft	19	49
Mica, rock, gray	5	54
Rock, brown, and mica	51	105
Rock, green, and mica	20	125
How-Df 1		
Patuxent formation:		
Clay, light	19	19
Clay, sandy, brown	5	24
Clay, red	4	28
Clay, sandy, brown	6	34
Sand, brown	12	46
Clay, red	10	56
Sand, brown	5	61
Clay, red	9	70
Clay, brown	48	118
Clay, gray	3	121
Sand, white (water)	8	129
How-Df 4		
Patuxent formation:		
Soil	2	2
Gravel	6	8
Clay	10	18
Sand and gravel	22	40
Clay, varicolored	35	75
Sand, very fine	2	77
Clay, red	21	98
Clay, white	5	103
Sand (water)	5	108
How-Df 7		
Patuxent formation:		
Gravel and sand	15	15
Clay, red	31	46

TABLE 3—*Continued*

	Thickness (feet)	Depth (feet)
Patuxent formation and/or gabbro:		
Clay, gray (water)	14	60
Gabbro:		
Stone, dark	88	148
How-Df 8		
Patuxent formation:		
Clay, yellow, mixed	25	25
Sand and clay, yellow	15	40
Gravel (water)	5	45
Clay, yellow	20	65
Sand, yellow (water)	5	70
Patuxent formation and/or gabbro:		
Clay, gray, mixed (water)	15	85
Gabbro:		
Stone, gray	3	88
How-Df 10		
Gabbro:		
Clay	4	4
Rock, weathered, and gravel	22	26
Rock, weathered	8	34
Rock, green	148	182
How-Df 11		
Patuxent formation:		
Clay, yellow; gravel and sand, coarse	15	15
Clay, red	10	25
Sand and clay, yellow (water)	5	30
Gabbro:		
Clay, blue	10	40
Rock, soft, blue, and clay, blue	5	45
Rock, soft, blue (water)	6	51
Rock, blue, seamed (water at 57 feet)	29	80
How-Df 14		
Patuxent formation:		
Clay, red	18	18
Sand and clay, yellow	2	20
Patuxent formation and gabbro:		
Sand and clay, blue	10	30
Gabbro:		
Rock, blue, soft	2	32
Rock, blue	20	52
Rock, blue-gray and white	8	60
How-Df 16		
Gabbro:		
Clay, yellow	25	25

TABLE 3—*Continued*

	Thickness (feet)	Depth (feet)
Stone (water at 30 feet)	25	50
Stone, mica	15	65
Stone, gray, mica	58	123
How-Df 17		
Patuxent formation:		
Clay, sandy, yellow	8	8
Sand, coarse, and gravel, pea-size, yellow	12	20
Sand, yellow, medium	8	28
Clay, mixed colors	12	40
Clay, sand, and gravel, fine	5	45
Sand, yellow, coarse; clay, mixed colors	3	48
Sand, and gravel, fine	2	50
Sand, yellow, coarse; gravel, pea-size	5	55
Sand, yellow, medium	15	70
Sand and clay, white	10	80
Sand, white, fine (water)	2	82
Sand, fine, and clay, white	28	110
Sand, yellow; thin layers of iron rock	4	114
Clay, yellow, and gravel, fine	1	115
Sand and clay, mixed colors	5	120
Gabbro:		
Clay, blue	5	125
Rock, blue, soft	3	128
Rock, blue, seamed (water at 146 feet)	90	218
Rock, blue-gray and white	66	284
Rock, blue, seamed (water at 284 to 285 feet)	20	304
How-Df 18		
Gabbro:		
Clay	20	20
Rock, rotten	20	40
Granite, gray	80	120
Granite, blue	40	160
Granite, gray	20	180
Granite, blue, very hard	30	210
Granite, gray	45	255
Granite, blue, very hard	30	285
Granite, gray	15	300
How-Df 19		
Patuxent formation:		
Sand	20	20
Silt (water)	20	40
Clay, dark	10	50
Charcoal (lignite?)	10	60
Sand	5	65
Red clay	5	70
Clay and gravel (water)	5	75

TABLE 4

Drillers' Logs of Wells in Montgomery County

	Thickness (feet)	Depth (feet)
Mont-Bd 2		
Ijamsville phyllite:		
Topsoil and clay	12	12
Shale and slate	18	30
Slate rock (water at 80 ft.)	135	165
Mont-Be 2		
Ijamsville phyllite:		
Gravel and clay, yellow	20	20
Shale, gray	30	50
Shale, gray; some flint	70	120
Shale and flint seams	210	330
Rock, blue, hard	20	350
Shale with flint seams	222	572
Mont-Be 3		
Ijamsville phyllite:		
Clay, yellow	40	40
Rock, weathered	15	55
Shale with mud seams	30	85
Shale with flint seams	263	348
Shale with running mud seams	22	370
Mont-Cb 7		
New Oxford formation:		
Shale, red	30	30
Sandstone, gray	30	60
Rock, red	14	74
Mont-Cc 2		
Harpers phyllite:		
Earth	20	20
Shale, red	40	60
Flint	50	110
Slate, blue	15	125
Mont-Cc 3		
Harpers phyllite and/or Ijamsville phyllite:		
Shale	40	40
Sand, black	20	60
Flint	45	105
Slate, blue	7	112
Mont-Cc 6		
Ijamsville phyllite:		
Earth	30	30
Slate, blue, and flint	25	55
Slate, blue	110	165

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Mont-Cc 13		
Ijamsville phyllite:		
Clay, yellow	10	10
Rock, yellow	30	40
Slate, blue	60	100
Mont-Cc 22		
Ijamsville phyllite:		
Earth	30	30
Flint	5	35
Shale, blue, and flint	51	86
Mont-Cc 23		
Harpers phyllite:		
Clay, yellow	7	7
Shale, brown	20	27
Shale, blue, and flint	40	67
Slate, blue	8	75
Clay, yellow	10	85
Mont-Cd 1		
Ijamsville phyllite:		
Earth	28	28
Shale	32	60
Flint and shale	60	120
Slate, blue	30	150
Mont-Cd 4		
Wissahickon formation (albite):		
Earth	25	25
Earth and shale	25	50
Shale and flint	15	65
Flint	34	99
Mont-Cd 5		
Ijamsville phyllite:		
Shale, red	40	40
Shale	35	75
Flint, white, and slate, blue	12	87
Mont-Cd 12		
Wissahickon formation (albite):		
Slate rock, soft	20	20
Slate rock, hard	64	84
Mont-Cd 13		
Ijamsville phyllite:		
Topsoil and clay	10	10
Slate and soapstone	50	60
Slate blue, and flint	75	135

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Mont-Ce 3		
Undifferentiated basic igneous rocks:		
Topsoil	2	2
Shale, blue	38	40
Rock, blue, hard	43	83
Mont-Ce 6		
Wissahickon formation (albite):		
Clay and subsoil	15	15
Rock or shale, yellow	85	100
Mont-Cf 7		
Wissahickon formation (albite):		
Topsoil	4	4
Shale	6	10
Sandy	80	90
Rock, blue, hard	8	98
Mont-Cg 2		
Wissahickon formation (oligoclase):		
Clay	40	40
Rock, soft	10	50
Mica schist	50	100
Mont-Cg 10		
Undifferentiated basic igneous rocks or Sykesville formation:		
Sand and clay	25	25
Granite, green	29	54
Mont-Cg 11		
Contact—undifferentiated basic igneous rocks and Sykesville formation(?):		
Rock, yellow, soft	90	90
Rock, black, hard	8	98
Mont-Cg 15		
Sykesville formation:		
Clay and boulders	28	28
Granite	32	60
Mont-Db 2		
New Oxford formation and/or Pleistocene deposits:		
Clay, red	30	30
New Oxford formation:		
Shale, red	45	75
Sandstone, red	75	150

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Mont-Db 3		
New Oxford formation:		
Clay, brown, and flint, white	35	35
Clay, yellow, and flint, white	64	99
Flint, white	11	110
Mont-Db 6		
New Oxford formation:		
Sand	7	7
Shale rock	11	18
Rock, hard	7	25
Shale	8	33
Rock, red	20	53
Rock, brown	18	71
Rock, red	23	94
Shale rock, red	26	120
Rock, brown	20	140
Rock, red	12	152
Rock, brown, hard	18	170
Mont-Db 7		
New Oxford formation:		
Sand	5	5
Rock, red, hard	30	35
Shale, red	15	50
Rock, brown	40	90
Rock, red	10	100
Rock, brown	25	125
Rock, red	25	150
Mont-Db 12		
New Oxford formation:		
Clay and shale, red	28	28
Rock, red	53	81
Mont-Dc 2		
New Oxford formation:		
Soil and shale, red	48	48
Rock, red, and sandstone, gray	82	130
Mont-Dc 3		
Ijamsville phyllite:		
Earth	20	20
Flint	35	55
Slate, blue, and flint	15	70

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Mont-Dc 7		
New Oxford formation:		
Earth	20	20
Shale, red	7	27
Sandstone and rock, red	108	135
Mont-Dd 1		
Wissahickon formation (albite):		
Clay	50	50
Rock, gray	89	139
Mont-Dd 16		
Wissahickon formation (albite):		
Earth	30	30
Flint	21	51
Mont-Dd 17		
Wissahickon formation (albite):		
Earth	35	35
Earth and flint	25	60
Slate, blue	65	125
Mont-De 1		
Wissahickon formation (albite):		
Clay (water)	25	25
Rock, soft	30	55
Rock, slightly harder	10	65
Rock, hard	10	75
Mont-De 3		
Wissahickon formation (albite):		
Clay, red	31	31
Clay, yellow and brown	51	82
Rock, rotten	5	87
Rock, brown	64	151
Rock, blue	35	186
Rock, brown	70	256
Rock, gray	62	318
Rock, brown	32	350
Rock, brown, with openings	5	355
Rock, gray	7	362
Mont-De 4		
Wissahickon formation (albite):		
Topsoil	5	5
Sand and clay	45	50
Rock or shale, yellow, soft	14	64
Shale or rock, yellow, hard	23	87

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Mont-De 7		
Wissahickon formation (albite):		
Clay	20	20
Sand	20	40
Shale	10	50
Mont-De 16		
Wissahickon formation (albite):		
Earth	16	16
Shale	20	36
Rock, blue, and flint	15	51
Rock, blue	4	55
Mont-De 17		
Serpentine:		
Topsoil	1	1
Rock, green and gray	52	53
Mont-De 19		
Wissahickon formation (albite):		
Clay, yellow, and flint, white	22	22
Shale, brown, and flint, white	33	55
Rock, blue	15	70
Mont-De 31		
Wissahickon formation (albite):		
Clay, sandy, brown	30	30
Gravel	12	42
Clay and sand, gray	13	55
Rock, soft	10	65
Granite, gray, hard	7	72
Granite, blue, very hard	88	160
Mont-De 32		
Wissahickon formation (albite):		
Soil, sandy, brown	20	20
Clay, pink	20	40
Boulders	10	50
Rock, gray, medium hard	145	195
Rock, blue, medium hard	35	230
Flint, white	3	233
Slate, gray	12	245
Rock, gray	15	260
Rock, blue, medium hard	18	278
Slate, gray	17	295
Slate and quartz	14	309

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Mont-De 33		
Wissahickon formation (albite):		
Clay, red	30	30
Clay, yellow	40	70
Rock, brown	20	90
Rock, brown and green	20	110
Slate, blue	50	160
Slate, flint	110	270
Granite, very hard	30	300
Mont-Df 3		
Wissahickon formation (albite):		
Clay	34	34
Sand	1	35
Clay	9.6	44.6
Rock	238.4	283
Mont-Df 8		
Wissahickon formation (albite):		
Clay and sand	50	50
Rock, yellow, soft	10	60
Rock, light green	30	90
Rock, dark green, hard	15	105
Mont-Df 10		
Sykesville formation:		
Topsoil	10	10
Clay and granite	50	60
Granite, black	80	140
Mont-Df 14		
Wissahickon formation (albite):		
Subsoil and sand	15	15
Granite	45	60
Granite or shale, soft	32	92
Mont-Df 16		
Wissahickon formation (albite):		
Clay	26	26
Sand	1	27
Hardpan	2	29
Sand (water)	10	39
Granite, salt and pepper	17	56
Granite, blue	79	135
Mont-Df 21		
Wissahickon formation (albite):		
Topsoil	2	2

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Shale	28	30
Granite	37	67
Mont-Df 24		
Wissahickon formation (albite):		
Clay, red	90	90
Granite, gray	60	150
Granite, gray, with openings	15	165
Granite, blue	100	265
Rock, brownish	65	330
Flint	20	350
Brown color, openings	45	395
Mont-Df 26		
Wissahickon formation (albite):		
Clay, red	60	60
Rock, rotten	3	63
Flint, granite	67	130
Granite, gray	130	260
Flint, and granite, gray; openings	40	300
Mont-Dg 5		
Wissahickon formation (oligoclase):		
Soil	20	20
Mica schist	18	38
Rock, blue, hard	214	252
Mont-Dg 8		
Wissahickon formation (oligoclase):		
Clay and shale, red and yellow	44	44
Flint rock, white	3	47
Shale	19	66
Flint rock, white	3	69
Clay, red	14	83
Bedrock	167	205
Mont-Dg 15		
Undifferentiated basic igneous rocks or Wissahickon formation (oligoclase):		
Clay, red	30	30
Sand and gravel	44	74
Mica rock	18	92
Mont-Dg 24		
Kensington granite gneiss:		
Flint, white, and shale, fractured	—	—
Granite	—	91

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Mont-Dg 25		
Wissahickon formation (oligoclase):		
Clay	40	40
Mica rock	45	85
Mont-Dg 26		
Kensington granite gneiss:		
Clay and gravel	17	17
Rock, hard	35	52
Mont-Dg 29		
Wissahickon formation (oligoclase):		
Clay, yellow	15	15
Clay, red	45	60
Rock, rotten	20	80
Rock, blue	40	120
Rock, salt and pepper	120	240
Rock, blue	75	315
Granite, salt and pepper	85	400
Mont-Dh 2		
Wissahickon formation (oligoclase)(?) and Pliocene(?) deposits:		
Fullers earth	3	3
Clay, red	27	30
Wissahickon formation (oligoclase):		
Shale, brown	35	65
Bedrock	41	106
Mont-Dh 3		
Wissahickon formation (oligoclase) and Pliocene(?) deposits:		
Clay and gravel	85	85
Wissahickon formation (oligoclase):		
Mica rock	41	126
Mont-Dh 6		
Wissahickon formation (oligoclase):		
Clay, red	20	20
Sand, soft	55	75
Mica rock	10	85
Granite, soft	41	126
Mont-Dh 7		
Wissahickon formation (oligoclase):		
Sand and clay	20	20
Sand	20	40
Rock, soft	10	50
Granite with mica	64	114

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Mont-Dh 10		
Wissahickon formation (oligoclase):		
Topsoil	2	2
Sand	54	56
Rock, gray	53	109
Mont-Dh 12		
Wissahickon formation (oligoclase) or Laurel gneiss and Pliocene(?) deposits:		
Clay, yellow	3	3
Sand and clay, yellow	13	16
Clay, red	26	42
Sand, red (water)	6	48
Clay, yellow	19	67
Clay, red	5	72
Rock, black	34	106
Mont-Di 1		
Patuxent formation:		
Clay, hard, gravelly	25	25
Patuxent formation(?) and Laurel gneiss:		
Sand and clay	50	75
Laurel gneiss:		
Clay	10	85
Rock	23	108
Mont-Di 2		
Patuxent formation:		
Earth	30	30
Laurel gneiss and Patuxent formation(?):		
Sand and earth	30	60
Flint and earth	25	85
Flint	20	105
Mont-Ec 1		
New Oxford formation:		
Clay, sandy, red	45	45
Shale, red	25	70
Sandstone, gray (water)	14	84
Mont-Ec 2		
Pleistocene and Recent deposits:		
Clay, yellow	10	10
Pleistocene and Recent deposits or New Oxford formation:		
Gravel	7	17
New Oxford formation:		
Sandstone, red	58	75

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Mont-Ed 2		
Wissahickon formation (albite):		
Earth, and shale, red	30	30
Flint	25	55
Rock, blue	10	65
Mont-Ee 2		
Wissahickon formation (albite):		
Earth and shale	46	46
Flint	29	75
Rock, blue	4	79
Mont-Ee 4		
Wissahickon formation (albite):		
Sand and clay	45	45
Sand, soft	10	55
Rock, black, similar to slate	25	80
Mont-Ee 5		
Wissahickon formation (albite):		
Topsoil	2	2
Sandstone, soft	28	30
Granite	87	117
Mont-Ee 8		
Wissahickon formation (albite):		
Clay, yellow	20	20
Sand and clay	50	70
Rock, blue	21	91
Mont-Ee 12		
Wissahickon formation (albite):		
Clay, yellow	10	10
Sand, brown	15	25
Flint, white	30	55
Rock, blue	39	94
Mont-Ee 14		
Serpentine(?):		
Topsoil	1	1
Rock, blue, soft	69	70
Rock, blue, hard	33	103
Mont-Ef 1		
Wissahickon formation (albite):		
Sand	40	40
Rock, green, hard	20	60
Sand rock, soft, clay (water at 65 feet)	8	68

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Rock, green	4.5	72.5
Flint and green rock, soft (water)	37.5	110
Approximately same as previous interval	52	162
Mont-Ef 12		
Wissahickon formation (albite):		
Earth	28	28
Flint	22	50
Rock, blue	12	62
Mont-Ef 13		
Wissahickon formation (albite):		
Shale, red	60	60
Flint and earth	20	80
Sand rock, gray	34	114
Mont-Ef 16		
Wissahickon formation (albite):		
Sand and clay (water at 20 feet)	70	70
Sandstone, soft	15	85
Sandstone, hard	15	100
Granite	20	120
Mont-Ef 19		
Contact—Wissahickon formation (oligoclase) and Kensington granite gneiss:		
Clay	20	20
Rock, soft	10	30
Rock	27	57
Mont-Ef 21		
Wissahickon formation (albite):		
Clay and sand	20	20
Sand, and clay, sandy	20	40
Granite, soft	8	48
Granite, hard	52	100
Mont-Ef 22		
Wissahickon formation (oliogoclase):		
Clay, red	35	35
Clay, brown, and gravel	50	85
Clay, brown, and sand	25	110
Sandstone	5	115
Mont-Ef 28		
Wissahickon formation (albite):		
Soil	60	60
Rock, soft	46	106

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Rock, gray, medium hard	134	240
Rock, gray, hard	28	268
Rock, gray, medium hard	112	380
Rock, gray, hard	24	404
Mont-Ef 30		
Wissahickon formation and/or Sykesville formation:		
Soil	4	4
Sand and gravel	21	25
Top rock and mica	5	30
Rock and mica	10	40
Sand rock	2	42
Sand rock and flint	3	45
Flint rock	38	83
Mont-Ef 31		
Wissahickon formation (albite):		
Soil	11	11
Rock, weathered	17	28
Flint boulders	8	36
Rock, gray, and flint seams	12	48
Rock, gray, hard	14	62
Rock, medium hard	6	68
Rock, green, with seams	23	91
Rock, gray, with flint	17	108
Mont-Ef 32		
Contact-Wissahickon formation (albite) and Sykesville formation:		
Clay, red	46	46
Granite, blue	104	150
Granite, and flint, white; openings	100	250
Granite, blue	50	300
Mont-Ef 36		
Wissahickon formation (albite):		
Clay, sandy	10	10
Clay, red	70	80
Flint, white	50	130
Slate, blue	30	160
Flint, white	10	170
Slate, blue, flint, mixed	180	350
Mont-Ef 39		
Wissahickon formation (albite):		
Clay	117	117
Rock, rotten	14	131
Flint, white	19	150

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Flint and mica	27	177
Mica granite	28	205
Granite, blue	78	283
Mont-Ef 41		
Wissahickon formation (albite):		
Clay, red	20	20
Rock, rotten	16	36
Rock, brown, very hard	114	150
Flint, white, and slate, blue	35	185
Slate, blue	55	240
Flint, white, and slate, blue	60	300
Mont-Eg 2		
Wissahickon formation (oligoclase):		
Sand, red	8	8
Rock, black	4	12
Sand rock, red	32	44
Sand rock, yellow	30	74
Sand rock	30	104
Granite, black	16	120
Mont-Eg 4		
Kensington granite gneiss:		
Soil	12	12
Sandstone	58	70
Granite	42	112
Flint rock	13	125
Mont-Eg 7		
Wissahickon formation (oligoclase):		
Clay	15	15
Shale	25	40
Rock, black	45	85
Mont-Eg 12		
Wissahickon formation (oligoclase):		
Sand rock, disintegrated	38	38
Rock, hard	92	130
(No record)	49	179
Mont-Eh 2		
Patuxent formation:		
Gravel, large	61	61
Laurel gneiss:		
Mica rock	81	142

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Mont-Eh 6		
Wissahickon formation (oligoclase):		
Topsoil	3	3
Sandy soil	35	38
Sand rock	52	90
Mica rock	48	138
Mont-Eh 8		
Laurel gneiss:		
Topsoil and clay	8	8
Granite gray	102	110
Mont-Eh 9		
Patuxent formation:		
Earth	2	2
Clay, yellow, and gravel	29	31
Laurel gneiss:		
Bedrock	24	55
Mont-Eh 10		
Patuxent formation and Laurel gneiss(?):		
Material, soft	29	29
Laurel gneiss:		
Granite, hard (water just below 30 feet)	74	103
Mont-Eh 12		
Laurel gneiss:		
Soil, micaceous, brown	2	2
Shale, micaceous, brown	8	10
Rock, micaceous, brownish gray (water)	10	20
Rock, micaceous, gray	15	35
Rock, micaceous, gray, hard	5	40
Mont-Fe 2		
Wissahickon formation (albite):		
Sand and clay	35	35
Sandstone, soft	7	42
Granite, with mica	33	75
Mont-Fe 4		
Wissahickon formation (albite):		
Clay, blue and red	65	65
Rock, rotten	20	85
Granite, gray	80	165
Granite, blue	116	281

TABLE 4—*Continued*

	Thickness (feet)	Depth (feet)
Mont-Fc 5		
Wissahickon formation (albite):		
Clay, yellow	10	10
Rock, blue	51	61
Mont-Ff 1		
Wissahickon formation (albite):		
Soil	16	16
Soil and flint boulders	24	40
Rock, weathered	15	55
Rock, gray, hard	150	205
Rock, gray, with flint seams	95	300
Mont-Ff 6		
Undifferentiated basic igneous rocks:		
Clay	45	45
Rock, hard	67	112
Mont-Ff 15		
Wissahickon formation (oligoclase):		
Soil and rotten rock	44	44
Rock, hard	270	314
Mont-Fg 6		
Wissahickon formation (oligoclase):		
Clay, mixed	20	20
Clay, blue	10	30
Rock, blue, rotten	10	40
Gneiss, blue	50	90
Rock, rotten (water)	6	96

The Surface-Water Resources

BY
ROBERT O. R. MARTIN

Introduction

Human life and progress are closely dependent upon water, and man can exist but a few days without it. The conservation and control of water, therefore, have become one of his vital problems. The demands of an advancing civilization have placed limitations on the use of water, especially after man abandoned his nomadic way of life and established a permanent home rather than moving continually from water hole to water hole. In densely populated areas, the demand for water very often approaches the limit of supply. Areas lacking in water are most often sparsely settled because the expense of transporting water is a burden to the homemaker. An adequate water supply is a prerequisite to the growth of our cities.

With increased demand for water many complex problems arise, such as pollution and contamination from known or unknown sources within the drainage basin. Water as precipitated by rain is pure, but man has a trying task to maintain this quality. Outbreaks of sickness and epidemics have been traced to impure drinking water. Clean, pure streams and lakes are important assets to a community for recreational purposes in addition to their value as sources of water supplies.

Navigation was one of the earliest uses of surface waters; but, with increased farming and industry, the use of streams for irrigation and industrial purposes has become more important. There are manifold industrial uses of surface waters for which temperature and chemical quality have become important factors.

The never-ending circulation of water in various forms from ocean and land surfaces to the atmosphere by evaporation and transpiration, from the atmosphere to the land by precipitation, and then back to the ocean is called the hydrologic cycle. As water travels from the land to the ocean, part runs off directly into the streams and part enters ground-water storage before later appearing as streamflow.

Although streamflow is indispensable to man, excessive amounts can cause tremendous damage and even loss of life. It has been the inclination of man to establish his home on or near a stream in order to have a readily accessible supply of water or means of transportation. As river settlements grow, the trend is for the flood plains of the stream to be encroached upon, and even for the normal stream channel to be crowded and its carrying capacity reduced by structures of all kinds. Thus, the tendency toward flooding is aggravated, and the actual or potential flood damages are vastly increased. The problem of flood control then arises. For the proper planning of flood control works such as dams, levees, or channel improvements, and the designing of bridges with adequate waterways, records of streamflow are needed over a sufficient number of years to establish the flood-flow characteristics of the stream.

STREAMFLOW MEASUREMENT STATIONS

To study systematically the range of streamflow in order to derive maximum benefits from it, the U. S. Geological Survey has installed numerous stream-gaging stations throughout the country. In cooperation with the Maryland Department of Geology, Mines and Water Resources, and other State, Federal, and municipal agencies, eighty-nine stations are in operation in Maryland. All of them are equipped with automatic water-stage recorders (Pl. 6, fig. 2), which collect a continuous record of the stage of the stream (fig. 16). In conjunction with the stage record, flow determinations must be made periodically by means of a precise instrument known as a current meter in order to correlate stage with discharge. (Pl. 7, fig. 1). The discharge corresponding to a given stage can be determined by interpolation, provided the channel conditions of the stream remain unchanged.

The selection of a site for a gaging station requires a careful appraisal of the stream channel to be assured that hydraulic conditions are stable and that a fixed relation between stage and discharge will be maintained. The gage must be accessible under adverse conditions of storm and high water, and the measurement of discharge of the stream must be possible at all stages. To avoid building expensive structures it is economical to benefit by the proximity of a bridge suitable for discharge measurements. In some cases there is no alternative except to erect a cableway across a stream. This cableway is generally suspended from high A-frames on each bank and is used to support a cable car. The elevation of the cableway must be sufficient to support an engineer and his measuring equipment with clearance above the stages of anticipated floods.

Present-day construction practice favors a permanent-type recording-gage structure. The usual gage well and house in Maryland is constructed of concrete block or reinforced concrete and has inside dimensions of about 4 feet square. The structure is provided with steel doors for house and well and is connected to the stream by one or more horizontal pipes or intakes to permit the water in the well to fluctuate simultaneously with the stream. The height of the structure is governed by the height of the maximum anticipated flood (Pl. 6, fig. 1).

A continuous graphic record of stage with respect to time is obtained by means of a water-stage recorder installed in the gage house to record the fluctuations of the water level in the gage well (fig. 16). The modern water-stage recorder requires very little attention. Inspections to change the continuous

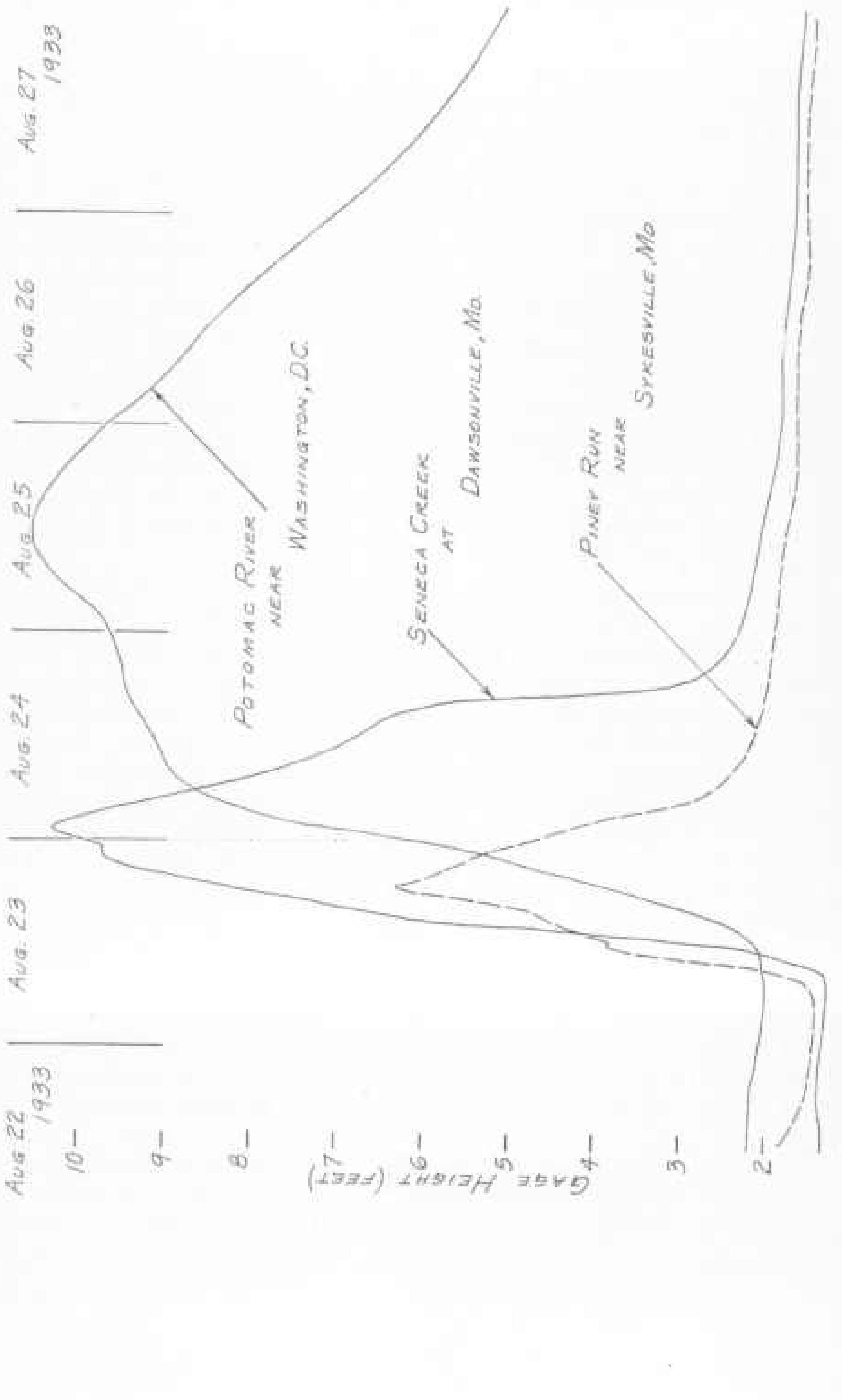

FIGURE 16. Graphs of River Stages from Automatic Water-Stage Recorders

recorder charts can be made once a month or even less frequently. Plate 6, figure 2, shows an automatic recorder in operation. In silt-laden streams it is necessary to clean the intake pipes by forcing water through them by means of a flushing device. Most of the streams in Maryland contain enough silt to require an intake-pipe flushing system.

The rate of flow of a stream, or the discharge, is the quantity of water passing a point in a given time. This quantity is expressed in terms of cubic feet per second, commonly called second-feet. Discharge varies with precipitation and with basin characteristics such as depth and texture of the soils and steepnes of the terrain. The discharge at any point on a stream can readily be determined by multiplying the cross-sectional area of the water by its velocity. Streamflow measurements are made periodically by means of a Price current meter which determines the velocity of the water. Plate 7, figure 1, shows a standard Price current meter mounted on a rod for use in making a discharge measurement by wading a stream and the smaller Pygmy meter designed for shallow streams. Plate 7, figure 2, shows the heavier crane and reel equipment used to measure deep swift streams. The purpose of a discharge measurement is to define the stage-discharge relation existing at that time (fig. 17).

Daily discharge records for the gaging-stations are published in annual water-supply papers of the United States Geological Survey, in Part 1 (Part 1-B subsequent to 1950) of the series called "Surface-Water Supply of the United States."

DEFINITION OF TERMS

The following technical terms are used in streamflow records.

Second-feet.—An abbreviation for "cubic feet per second." A cubic foot per second, or cfs, is the rate of discharge of a stream whose channel is 1 square foot in cross-sectional area and whose average velocity is 1 foot per second.

Discharge.—A rate of flow of water, usually expressed in second-feet. One second-foot flowing for one day equals 86,400 cubic feet, equals 646,317 gallons, equals about 2.0 acre-feet (an area of one acre covered with two feet of water).

Cubic feet per second per square mile.—An average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the runoff is distributed uniformly as regards both time and area.

Million gallons per day per square mile.—An average number of gallons of water flowing per day from each square mile of area drained, on the assumption that the runoff is distributed uniformly as regards both time and area. One million gallons per day equals 1.5472 cfs, equals 3.07 acre-feet per day.

Runoff in inches.—The depth to which an area would be covered if all the water draining from it in a given period were uniformly distributed on its surface.

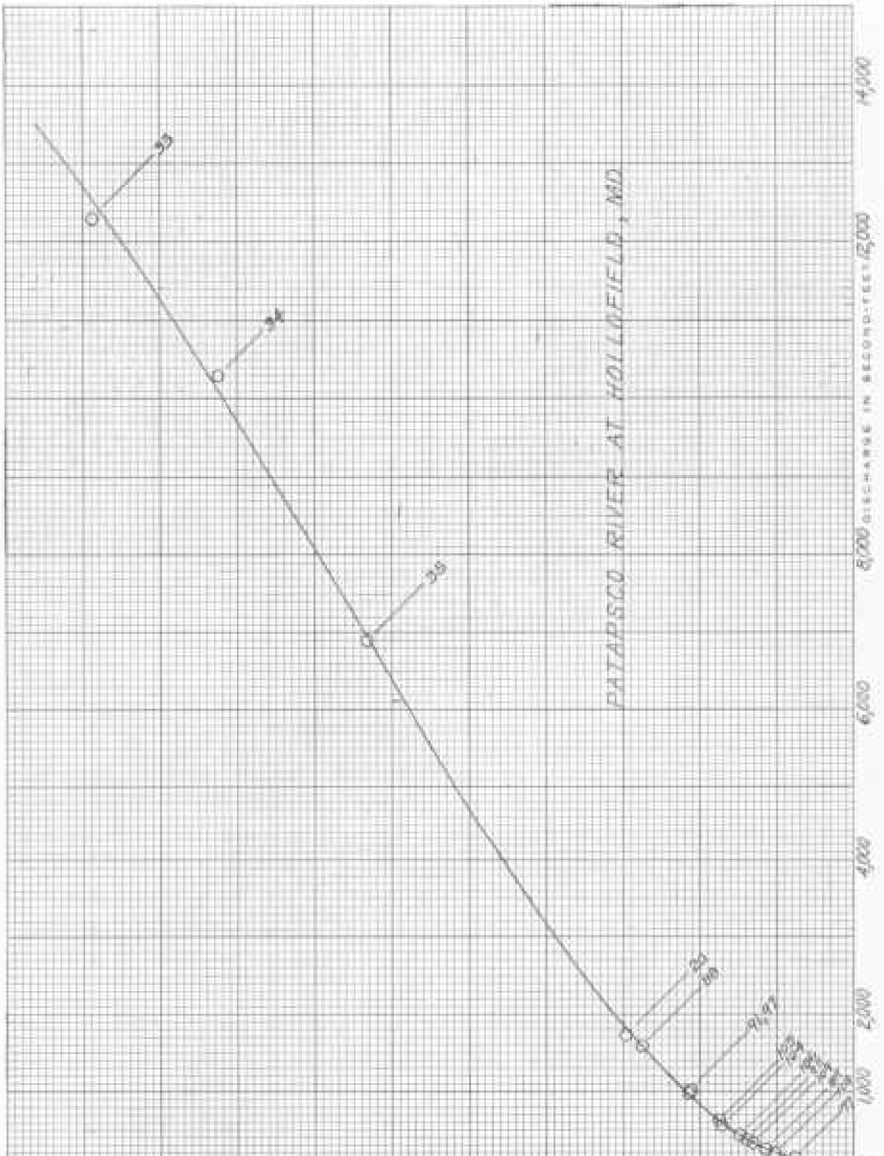

Figure 17. Typical Rating Curve Showing Stage-Discharge Relation

Drainage basin.—The area drained by a stream or stream system, usually expressed in square miles.

Water year.—A special annual period selected to facilitate water studies, commencing October 1 and ending September 30.

SURFACE-WATER RESOURCES

Howard and Montgomery Counties lie in the Piedmont province. The topography consists of low, rolling hills, with an eastward slope, so that all streams flow southeastward into Chesapeake Bay from drainage basins that are more or less parallel. Major streams form most of the natural boundaries for both counties. The boundary between them is the Patuxent River. They are bounded on the northeast by the Patapsco River and on the southwest by the Potomac River (fig. 18).

The southern tip of Montgomery County is adjacent to the District of Columbia, and the southeastern boundary extends north-north-eastward from the District line near Tacoma Park to the Patuxent River just west of Laurel. The northwestern boundary starts at the confluence of the Potomac and Monocacy Rivers and extends north-eastward to the headwaters of the South Branch of the Patapsco River near Mount Airy.

The northern and northeastern boundaries of Howard County are the South Branch Patapsco River and the Patapsco River respectively. Deep Run, a Patapsco River tributary, forms the southeastern boundary from its mouth to the railroad crossing at Dorsey. The boundary then follows the Baltimore and Ohio Railroad to Laurel. Howard County, therefore, has natural stream boundaries except for this railroad boundary, which really is also a natural boundary, being the "Fall Line" defining the eastern edge of the Piedmont and the western edge of the Coastal Plain.

Stream beds are composed mostly of sand and gravel with only occasional outcrops of ledge rock. The generally soft loam banks of the streams are heavily wooded except where pastures have been cleared. During most years these low banks have been overflowed many times by floods, and the critical channel sections have been gradually eroded by flood velocities so that the resultant channels follow meandering courses through woods, pasture, or rich farm land (Pl. 5). In the absence of any mountains there are no steep channel gradients, so that most of the streams flow sluggishly along poorly-defined channels but safely above tidal effect with all streams free from marshes or any brackish water. Except for the flat topography and sinuous stream channels, there is an absence of factors that tend to delay runoff, such as natural lakes, ponds, and swamps.

Both Howard and Montgomery Counties have shown an early and continued interest in water resources. Stream gaging began on the Potomac River at Chain Bridge at Washington, D. C., in 1886 and now there are 18 gaging

FIGURE 18. Map of Howard and Montgomery Counties showing Principal Streams and Gaging Stations

stations measuring flow within the counties or near their boundaries. In addition there are 8 discontinued gaging stations. This bi-county area is one of the most concentrated streamflow investigational areas in Maryland, having more than 250 station-years of records (through Sept. 30, 1952) from gaging stations now operating and 77 station-years of former records from discontinued stations.

Present surface-water supplies are obtained mainly from the Patuxent River upstream from Laurel and from the Northwest Branch Anacostia

River. The drainage areas, about 130 and 50 square miles respectively, lie mostly in Montgomery County. The continued use of the Northwest Branch Anacostia River is questionable owing to the gradual decrease in quality from encroachment by a great many new residences. This ever-expanding housing development is detrimental to a safe water supply. There are only two municipal surface-water supplies in Howard and Montgomery Counties, the large metropolitan area in Montgomery County and the small Ellicott City area, in Howard County. In 1918 the Washington Suburban Sanitary Commission was created by the General Assembly of Maryland to provide a water supply for the Maryland suburbs of Washington, D. C. in Prince Georges and Montgomery Counties. This amounted to 30 million gallons a day in 1953 approximately half of which was consumed in Montgomery County. The ground-water consumption in Howard and Montgomery Counties averaged only about 4.5 million gallons a day for the combined domestic, agricultural, institutional, and public uses.

The Rocky Gorge Dam of the Washington Suburban Sanitary Commission in Montgomery County just upstream from Laurel, is expected to be completed about May 1954 at a cost of $5.8 million, creating additional storage on the Patuxent River to supplement existing upstream storage in Triadelphia Reservoir above Brighton Dam. These dams will provide a total storage of about 12 billion gallons and the flow of the Patuxent River will become almost completely regulated. The augmented water supply is estimated to be adequate until 1960, as the new system will provide 43.7 million gallons a day during a maximum dry period, whereas the average daily consumption during 1952 amounted to only 28 million gallons a day.

Most of the other streams within Howard and Montgomery Counties are small and probably will never be developed for public water supply. The Washington Suburban Sanitary Commission eventually may consider the Middle Patuxent and Little Patuxent Rivers or possibly even the Potomac River. The Potomac River, however, is preempted for use of the City of Washington, and due to pollution from large Maryland cities upstream this supply would require more expensive treatment.

The North Branch Patapsco River has been taken recently as a water-supply source by the Bureau of Water Supply for the City of Baltimore. Liberty Dam (in Baltimore County) is to be completed by June 1954 at a cost of $4.9 million creating an additional usable storage of 42 billion gallons, which, based on estimated future consumption, should make this system also adequate until 1960. This new source for the Baltimore water supply together with the original source from Gunpowder Falls will utilize the $11.6 million Ashburton filtration plant now under construction. The distant future source of water supply for Baltimore eventually may involve the major tributaries of the South Branch Patapsco River or Little Gunpowder Falls or even the Susquehanna River.

Irrigation has not been an economic requirement in Howard and Montgomery

Counties as rainfall has been ample for farming. Long-term U. S. Weather Bureau records at Washington, D. C., show that rainfall has averaged nearly 41 inches annually with a maximum monthly record of 17.45 inches in September 1934. During the past half century (1900–53) the actual annual mean of 42.18 inches has been slightly greater than the long-term average. The rainfall pattern has been fairly evenly distributed throughout the year. Summers are warm and humid and winters mild. Temperatures range from 105.6° F. to −14.9° F. and the maximum single snow fall recorded was 28 inches. The growing season has averaged about 200 days. There has been a slight trend by individual farmers in recent years towards small stock ponds built in cooperation with the U. S. Soil Conservation Service for the purpose of conserving excess rainfall and distributing it as needed. There are no multiple-purpose dams used for irrigation.

The more important streams of Howard and Montgomery Counties and their drainage areas at selected points are listed in Table 18, based chiefly on data in the "report to the General Assembly of Maryland by the Water Resources Commission of Maryland, January 1933." The principal streams are shown in figure 18.

GAGING STATIONS IN AND NEAR HOWARD AND MONTGOMERY COUNTIES

Streamflow records ending September 30, 1952 contained in this report from the 18 active gaging stations represent at least 250 complete station-years with the longest continuous record of 28½ years at Colesville. The records average about 14 complete water years per station and include three 4-year stations, five 8-year, one 12-year, two 14-year, one 20-year, one 21-year, two 22-year, two 23-year, and one 28-year. The records for the discontinued stations average only 10 complete water years per station but include a 31½-year (1913–45) continuous record at Burtonsville. Geographically these gaging stations are fairly well distributed.

Bulletin 1, Maryland Department of Geology, Mines and Water Resources, "Summary of Records of Surface Waters of Maryland and Potomac River Basin, 1892–1943," published in 1944, gives discharge records by calendar months of the maximum, mean, and minimum daily flows, and the discharge in cubic feet per second per square mile, runoff in inches, and discharge in millions of gallons per day per square mile for all gaging stations in Maryland from their dates of establishment to September 30, 1943. For monthly data prior to October 1, 1943, therefore, Bulletin No. 1 is referred to for the indicated dates of the gaging stations shown in Table 19.

This report includes records for all gages from October 1, 1943 through September 30, 1952. The drainage areas and the available years of records for these gaging stations are presented in Table 20. Their locations are shown on figure 18. Average discharge in cubic feet per second per square mile for the period of record is summarized in Table 21.

TABLE 18

Drainage Areas of Streams in Howard and Montgomery Counties

Name of stream in downstream order	Tributary to:	Drainage area (square miles) At point	Drainage area (square miles) U.S.G.S. gage
North Branch Patapsco River near Reisterstown	Patapsco		91.0
Morgan Run at mouth	North Branch Patapsco	44.6	
North Branch Patapsco River at Liberty Dam	Patapsco	164	
North Branch Patapsco River near Marriottsville	Patapsco		165.0
North Branch Patapsco River above South Branch Patapsco River	Patapsco	171.0	
South Branch Patapsco River above Gillis Falls	North Branch Patapsco	11.4	
Gillis Falls near Day (hwy. bridge 3.1 mi. upstream from mouth)	South Branch Patapsco	10.5	
Gillis Falls at mouth	South Branch Patapsco	19.3	
Piney Run near Sykesville (hwy. 32)	South Branch Patapsco		11.4
Piney Run at mouth	South Branch Patapsco	18.2	
South Branch Patapsco River at Henryton (hwy. 101)	North Branch Patapsco		64.4
South Branch Patapsco River at mouth	North Branch Patapsco	85.7	
Patapsco River at Woodstock	Chesapeake		251
Patapsco River at Hollofield (hwy. 100)	Chesapeake		285.4
Sucker Branch at mouth (Ellicott City)	Patapsco	2.9	
Patapsco River at Avalon (hwy. bridge.)	Chesapeake	310.3	
Rockburn Branch at mouth	Patapsco	3.71	
Deep Run above Piny Run	Patapsco	8.6	
Piny Run at mouth	Deep Run	4.26	
Deep Run at mouth	Patapsco	19.9	
Patapsco River at Landsdowne (hwy. 167)	Chesapeake	358.7	
Patapsco River near Landsdowne (hwy. 301)	Chesapeake	360	
Patuxent River at Unity (hwy. 97)	Chesapeake		34.8
Patuxent River above Cattail Creek	Chesapeake	35.5	
Cattail Creek at Roxbury Mills	Patuxent		27.7
Cattail Creek at mouth	Patuxent	28.5	
Patuxent River at Brighton Dam	Chesapeake	81.4	
Hawlings River at mouth	Patuxent	28.4	
Patuxent River near Ashton (1 mi. down stream from Hawlings River)	Chesapeake		110.4
Patuxent River near Burtonsville (Columbia Pike)	Chesapeake		127.3

TABLE 18—*Continued*

Name of stream in downstream order	Tributary to:	Drainage area (square miles)	
		At point	U.S.G.S. gage
Patuxent River at Rocky Gorge Dam	Chesapeake	131.8	
Patuxent River near Laurel	Chesapeake		133
Patuxent River at Laurel Dam	Chesapeake	135.5	
Patuxent River at Laurel (hwy. 1)	Chesapeake		137
Patuxent River above Little Patuxent River	Chesapeake	181.2	
Little Patuxent River at Guilford (hwy. 32)	Patuxent		38.0
Middle Patuxent River at mouth	L. Patuxent	57.8	
Little Patuxent River at Savage (upper bridge)	Patuxent	97.8	
Little Patuxent River at Savage (hwy. 1)	Patuxent		98.4
Dorsey Run (at Annapolis Junction) near Jessup	L. Patuxent		11.6
Little Patuxent River at mouth	Chesapeake	161.4	
Bennett Creek above Little Bennett Creek	Monocacy	2.7	
Little Bennett Creek at mouth	Monocacy	24.6	
Bennett Creek at Park Mills	Monocacy		62.8
Bennett Creek at mouth	Monocacy	66.1	
Great Seneca Creek near Gaithersburg	Potomac		41.0
Great Seneca Creek near Old Germantown (hwy. 117)	Potomac		43.8
Gunners Branch near Old Germantown (hwy. 117)	Gt. Seneca	2.92	
Great Seneca Creek at mouth	Potomac	62.6	
Little Seneca Creek at Boyds (hwy. 221)	Gt. Seneca	21.4	
Little Seneca Creek at mouth	Gt. Seneca	38.8	
Seneca Creek at Dawsonville (hwy. 107)	Potomac		101.4
Dry Seneca Creek at mouth	Seneca	19.2	
Seneca Creek at mouth	Potomac	129.3	
Muddy Branch at mouth	Potomac	19.2	
Watts Branch near Potomac (hwy. 190)	Potomac	17.3	
Sandy Branch at mouth	Watts	5.6	
Watts Branch at mouth	Potomac	22.3	
Potomac River at Great Falls	Potomac		11,460
Cabin John Creek at mouth	Potomac	25.6	
Potomac River near Washington, D. C. (Leiters)	Potomac		11,560
Potomac River near Washington, D. C. (Chain Bridge)	Potomac		11,570
Little Falls Branch near Bethesda (hwy. 396)	Potomac		4.1
Rock Creek at Viers Mills (Randolph Rd.)	Potomac	41	
Rock Creek at Dist. of Columbia line	Potomac	59.8	
Rock Creek at W. Beech Drive, D. C.	Potomac	60.1	
Rock Creek at Sherrill Drive, D. C.	Potomac		62.2
Rock Creek at Q St., D. C.	Potomac		75.8
Rock Creek at mouth	Potomac	76.5	

TABLE 18—*Continued*

Name of stream in downstream order	Tributary to:	Drainage area (Square miles)	
		At point	U.S.G.S. gage
Potomac River at Washington, D. C. (14th St. Br.)	Potomac	11,677	
Northeast Branch Anacostia River at Riverdale (hwy. 412)	Anacostia		72.8
Northeast Branch Anacostia River at mouth	Anacostia	75.6	
Paint Branch at county line (Pr. Geo.)	Northeast Branch Anacostia	14.0	
Little Paint Branch at mouth	Paint Branch	10.8	
Paint Branch at College Park (hwy. 1)	Northeast Branch Anacostia	30.6	
Paint Branch at mouth	Northeast Branch Anacostia	31.5	
Indian Creek at mouth	Northeast Branch Anacostia	29.1	
Beaverdam Creek at mouth	Indian Creek	13.7	
Greenbelt Lake at outlet	Indian Creek	.83	
Briar Ditch near East Riverdale (hwy. 205)	Indian Creek	3.9	
Northwest Branch Anacostia River at Norwood (0.35 mi. E. of hwy. 182)	Anacostia		2.43
East Fork Northwest Branch Anacostia River near Cloverly (0.8 mi. N.W. of hwy. 29)	Anacostia		.36
North Fork Northwest Branch Anacostia River near Oakdale (1.1 mi. E. of hwy. 97)	Anacostia		.97
North Fork Northwest Branch Anacostia River near Norbeck (hwy. 609)	Anacostia		2.89
Northwest Branch Anacostia River near Layhill (1.6 mi. upstream from gage near Colesville)	Anacostia		13.59
West Fork Northwest Branch Anacostia River at Layhill (0.45 mi. W. of hwy. 182)	Anacostia		1.66
Northwest Branch Anacostia River near Colesville (off hwy. 183)	Anacostia		21.3
Northwest Branch Anacostia River at Burnt Mills Dam (off hwy. 29)	Anacostia	27.0	
Northwest Branch Anacostia River near College Park (hwy. 193)	Anacostia	33.8	
Sligo Branch at Colesville Road (hwy. 29)	Northwest Branch Anacostia	4.77	

TABLE 18—*Continued*

Name of stream in downstream order	Tributary to:	Drainage area (Square miles)	
		At point	U.S.G.S. gage
Sligo Branch at New Hampshire Ave. (hwy. 650)	Northwest Branch Anacostia	9.24	
Long Branch at Carroll Ave. (hwy. 195)	Sligo Branch	1	
Sligo Branch at mouth	Northwest Branch Anacostia	13.3	
Northwest Branch Anacostia River near Hyattsville (hwy. 210)	Anacostia		49.4
Northwest Branch Anacostia River above Northeast Branch Anacostia River	Anacostia	53.2	

STORAGE RESERVOIRS IN HOWARD AND MONTGOMERY COUNTIES

Triadelphia Reservoir, on the Patuxent River upstream from Brighton Dam, with drainage area of 78.4 square miles, is the principal storage used by the Washington Suburban Sanitary Commission. The dam, 48 feet high with spillway crest at 350 feet above mean sea level elevation, creates a reservoir with a usable maximum design capacity of 8,940 acre-feet. This reservoir, with surface area of 857 acres for the maximum design level of 365 feet above mean sea level (top of the gates), began storage on June 27, 1942.

Rocky Gorge Dam, 10 miles downstream from Brighton Dam, is scheduled for completion by May 1954, according to the Washington Suburban Sanitary Commission. Work was started in March 1952. The entire cost is estimated to be $5.75 million of which $3 million is for dam and pumping station. The dam, 132 feet high with spillway crest at 285 feet above mean sea level, will create a usable storage capacity of 18,110 acre-feet. The surface area of the reservoir will be 773 acres at level of spillway crest and 864 acres at maximum design level. The drainage area at Rocky Gorge Dam is 131.8 square miles, or 53.4 square miles greater than at Brighton Dam. The dam will supplement the present system with almost complete regulation.

Burnt Mills Dam on the Northwest Branch Anacostia River is 32 feet high with spillway crest at elevation 234 feet above mean sea level. The reservoir has a storage capacity of 181 acre-feet and a surface area of 20 acres. Flashboards 4 feet high can be added to the crest. The drainage area is 27 square miles.

Liberty Dam, under construction on the North Branch Patapsco River for the Bureau of Water Supply, City of Baltimore, is in Carroll and Baltimore

TABLE 19

Stream-gaging Records Included in This Report or Previously Published

No. on map	Gaging station records	Published in Maryland Bulletin 1	Published in special reports	Years of monthly records in this report
	10 Stations with records prior to 1944			76
1	North Branch Patapsco River near Marriottsville	1929–43		9
3	Piney Run near Sykesville	1931–43		9
11	Little Patuxent River at Guilford	1932–43		9
12	Little Patuxent River at Savage	1939–43		9
16	Seneca Creek at Dawsonville	1931–43		9
18	Potomac River near Washington (Leiters) D.C.	1930–43		9
21	Rock Creek at Sherrill Drive, Washington, D.C.	1930–43		9
24	Northeast Branch Anacostia River at Riverdale	1938–43	[b] 1944–50	2
25	Northwest Branch Anacostia River near Colesville	1924–43		9
26	Northwest Branch Anacostia River near Hyattsville	1938–43	[b] 1944–50	2
	8 Stations with records since 1944			46
2	South Branch Patapsco River at Henryton, Aug. 1948			4
5	Patapsco River at Hollofield, May 1944			8
6	Patuxent River at Unity, July 1944			8
7	Cattail Creek at Roxbury Mills, July 1944			8
10	Patuxent River near Laurel, Oct. 1944		[b] 1944–50	2
13	Dorsey Run (at Annapolis Junct.) near Jessup, July 1948			4
14	Bennett Creek at Park Mills, July 1948			4
19	Little Falls Branch near Bethesda, June 1944			8
	8 Stations with discontinued records			31
4	Patapsco River at Woodstock	1896–1909		0
8	Patuxent River near Ashton	[a] 1939–42		0
9	Patuxent River near Burtonsville	1911–43	[b] 1944–45	0
15	Great Seneca Creek near Gaithersburg	1925–31		0
17	Potomac River at Great Falls	—	[c] 1886–1891	6
			[d] 1896–1920	23
20	Potomac River at Washington (Chain Bridge) D.C.	—	[c] 1892–1893	2
22	Rock Creek at Zoological Park, Washington, D.C.	—		0
23	Rock Creek at Q St. Washington, D.C.	1892–94, 1929–30, 31–33		0

[a] Bulletin 1, p. 278, results of 35 current-meter measurements made during period Aug. 15, 1939 to Sept. 25, 1942 only; no discharge records.

[b] Bulletin 10, 1952, "Prince Georges County Geology and Water Resources."

[c] Mean, maximum, minimum daily discharges, runoff depth in inches, and cfs per square mile per calendar month in 14th Annual Report, U.S.G.S., Part 2, 1894, pp. 135–137; not in Maryland Bulletin 1.

[d] Bulletin 31, 1927, Virginia Geol. Survey, "Water Resources of Virginia."

TABLE 20

Stream-gaging Stations in and near Howard and Montgomery Counties

No. on map	Stream-gaging stations in Maryland (or D.C.)	Drainage area (sq.mi.)	Stream-flow records*
1	North Branch Patapsco River near Marriottsville	165	Oct. 1, 1929 (1-27 estimated)-
2	South Branch Patapsco River at Henryton	64.4	Aug. 18, 1948-
3	Piney Run near Sykesville	11.4	Sept. 22, 1931-
4	Patapsco River at Woodstock	251	Aug. 6, 1896-Mar. 31, 1909
5	Patapsco River at Hollofield	285	May 22, 1944-
6	Patuxent River at Unity	34.8	July 20, 1944-
7	Cattail Creek at Roxbury Mills	27.7	July 20, 1944-
8	Patuxent River near Ashton	110	Aug. 15, 1939-Sept. 25, 1942
9	Patuxent River near Burtonsville	127	July 21, 1911-June 15, 1912 July 21, 1913-Feb. 6, 1945
10	Patuxent River near Laurel	133	Oct. 1, 1944-
11	Little Patuxent River at Guilford	38.0	May 3, 1932-
12	Little Patuxent River at Savage	98.4	Nov. 27, 1939-
13	Dorsey Run (at Annapolis Junction) near Jessup	11.6	July 1, 1948-
14	Bennett Creek at Park Mills	62.8	July 29, 1948-
15	Great Seneca Creek near Gaithersburg	41.0	Mar. 19, 1925-Jan. 13, 1931
16	Seneca Creek at Dawsonville	101	Sept. 26, 1930 (26-30 unpublished)-
17	Potomac River at Great Falls	11,460	[a] Oct. 1, 1896-June 30, 1920
18	Potomac River (at Leiters Estate), Wash., D.C.	11,560	Mar. 22, 1930-
19	Little Falls Branch near Bethesda	4.1	June 19, 1944-
20	Potomac River (at Chain Bridge) at Wash., D.C.	11,570	[b] May 4, 1891-May 4, 1893 [b] Dec. 19, 1894-Feb. 22, 1896 [b] Nov. 21, 1910-Dec. 31, 1910
21	Rock Creek (at Sherrill Drive) at Wash., D.C.	62.2	Oct. 21, 1929-(1-20 estimated)-
22	Rock Creek (at Zoological Park) at Wash., D.C.	—	[c] Jan. 18, 1897-Nov. 10, 1900
23	Rock Creek (at Q St. or Lyons Mills) Wash., D.C.	75.8	Aug. 18, 1892-Nov. 30, 1894 Oct. 18, 1929-Sept. 30, 1930 July 15, 1931-Sept. 30, 1933
24	Northeast Branch Anacostia River at Riverdale	72.8	Aug. 13, 1938-
25	Northwest Branch Anacostia River near Colesville	21.3	Feb. 27, 1924-
26	Northwest Branch Anacostia River near Hyattsville	49.4	July 12, 1938-

TABLE 20—*Continued*

Peak Flow Research and Development Project in Drainage Basin of Northwest Branch Anacostia River near Colesville, Md.

Symbol on map	Crest-stage determination site	Type of gage	Drainage area (sq.mi.)	Crest-stage records*
A	Main stem at Norwood	recording gage	2.43	Mar. 25, 1948–
B	East Fork near Cloverly	crest-stage indicators	.36	Apr. 1948–
C	North Fork near Oakdale	crest-stage indicators	.97	Feb. 1948–
D	North Fork near Norbeck	crest-stage indicators	2.89	Feb. 1948–
E	Main stem near Layhill	crest-stage indicators	13.59	Feb. 1948–
F	West Fork at Layhill	crest-stage indicators	1.66	Feb. 1948–

* Stations for which no closing dates are shown are still in operation.

[a] Monthly mean discharge published for 1886–1891 and daily discharge for period shown.

[b] Daily gage heights recorded; monthly mean discharge published for 1892 and 1893 calendar years.

[c] Daily gage heights and current-meter measurements only; discharge not published.

Counties. The diversion of flow from the North Branch Patapsco River did not begin until Feb. 26, 1953, so did not affect any of the records for the downstream gaging stations in this report.

RUNOFF IN HOWARD AND MONTGOMERY COUNTIES

MAXIMUM FLOOD RUNOFF

The periods of collection of streamflow data are only relatively recent throughout the United States. In Maryland, most of the information concerning major floods is contained in U. S. Geological Survey Water-Supply Paper 771, "Floods in the United States—magnitude and frequency." Potomac River basin floods are known at selected sites since 1882 when systematic records began; since 1852 from high-water marks resurrected at a later date by the Corps of Engineers, U. S. Army; and since 1748 from various historical sources. These floods are discussed in Water-Supply Paper 800, "The Floods of March 1936 on Potomac and . . . . Rivers."

For the area comprised by Howard and Montgomery Counties the greatest known flood was that of August 23–24, 1933. There have been greater but isolated floods at particular gaging stations due to thunder storms rather than general storms. A typical example is the storm of August 8, 1953, and the resultant flood on the Northwest Branch Anacostia River near Colesville where the August 23, 1933, previous record was overtopped by 2.69 feet.

The storm of August 23, 1933, although not the most severe in the history of Maryland, caused the most widespread damage. At Baltimore the 24-hour rainfall of 7.62 inches exceeded the 24-hour record since 1817 and also established August 1933 as the wettest month probably since 1817 and definitely since 1871 when statistical tabulations began. At Washington, D. C., the 24-hour rainfall of 6.40 inches was accompanied by wind velocity as high as 51 miles per hour. A greater 24-hour rainfall at Washington, D. C., of 7.31 inches on August 11–12, 1928 apparently did not produce any floods of the magnitude of August 23–24, 1933.

MINIMUM DROUGHT RUNOFF

Extreme drought conditions prevailed throughout Maryland from 1930 to 1934. The drought commenced in 1930 when the State annual precipitation averaged only 24 inches as compared with a 54-year average of 42 inches. For details on drought studies see U. S. Geological Survey Water-Supply Paper 680, "Droughts of 1930–34." Maryland's 1930 drought was more severe than in any of the 30 States in the humid part of the United States. The decrease in the precipitation to 57 percent of the normal precipitation in Maryland and Delaware was greater than that recorded in any of the 30 humid States, not only for 1930 but for their most severe drought year.

The gaging station on Rock Creek at Sherrill Drive, Washington, D. C., recorded a 7-day (October 1–7, 1930) consecutive all-time minimum daily discharge of 0.5 cfs from a 62.2 square mile drainage area, yielding only 0.008 cfs per square mile. This minimum discharge per square mile for Rock Creek is one of the lowest recorded at any Maryland gaging station where flow is unaffected by regulation or diversion. At many gaging stations the minimum flow is affected by upstream diversion or river regulation, or at some future date may become subject to some kind of artificial condition. These progressive artificial changes become more and more complex and introduce difficulties in comparing streamflow records.

At Washington, D. C., the longest period without any appreciable rainfall, according to the U. S. Weather Bureau, extended from October 15 to November 11, 1901, a total of 28 days. The only gaging station in operation at that time in Howard and Montgomery Counties was on the Patapsco River at Woodstock, with a rather large drainage area of 251 square miles. The records for this station do not reflect any remarkable period of low flow at that time. In the lack of any authentic information to the contrary, therefore, it has been assumed that the prolonged drought during the early 1930's was the most severe ever known in this area, and possibly even in any of the humid portions of the United States. The critical low flows in 1930 for Rock Creek and Seneca Creek, the two lowest recorded at that time in Maryland, indicate that Washington, D. C., and its suburban area probably experienced one of the nation's worst droughts on or about Oct. 1, 1930.

AVERAGE RUNOFF

Streamflow records in this report are of various lengths during the period from 1892 to 1952. The four major drainage basins in which the records were collected receive substantially equal amounts of rainfall. The runoff from the drainage basins upstream from the gaging stations, the areas of the drainage basins, and the periods of comparable record are presented in Table 21.

An appraisal of the discharge per square mile from streams presented in Table 21 reveals the characteristics of the different river basins and definite trends during the periods of records. The most representative record for each basin indicates the average runoff increases towards the north. The progressive increase in the approximate average for each basin is 0.92, 0.97, 1.01, and 1.09 cfs per square mile respectively, for the Potomac, Anacostia, Patuxent and Patapsco Rivers.

The discharge per square mile for the latest 4-year period (1949–52) averages about 13 percent more than for the latest 8-year period (1945–52), and that for the latter is 17 percent more than for the latest 23-year period (1930–52). The discharge per square mile in this area for the past decade, therefore, may be assumed to be more than 10 percent higher than long-term averages covering the past half century. This trend in runoff is consistent with the similar trend in the precipitation records of the U. S. Weather Bureau.

The discharge per square mile for the water year 1951–52 was the maximum of record for all gages in the Patapsco, Patuxent and Anacostia River basins as well as for the gages on Rock Creek and Little Falls Branch in the Washington, D. C., area of the Potomac River basin.

STREAMFLOW REGULATION

It has been claimed that each year more money is spent to obtain water than is spent for any one of the other natural resources. This contention is well founded as water is used by everyone, and is used either directly or indirectly in every industry.

The history of stream gaging in Howard and Montgomery Counties illustrates the gradual development in the use of water resources. Most streams were unregulated at the beginning of their gaging-station record but have since become seriously affected by artificial regulation from upstream storage reservoirs or by the diversions of flow into or out of the stream at points upstream from the gaging station. In this way the greatest benefits are often derived from a stream and such diversified use provides a means for achieving the greatest economy in the utilization of water. Unfortunately, diversions often impair the quality of the water, as in the case of the Potomac River, which receives a more or less constant inflow of sewage from several large municipalities.

TABLE 21

Average Discharge from Streams in Howard and Montgomery Counties (in cfs per sq. mi.)

Period of record			Potomac River								Anacostia River			Patuxent River								Patapsco River				
			Drainage area (sq. mi.)								Drainage area (sq. mi.)			Drainage area (sq. mi.)								Drainage area (sq. mi.)				
From	To	Years	4.1	41.0	62.2	62.8	75.8	101	11,460	11,560	21.3	49.4	72.8	11.6	27.7	34.8	38.0	98.4	127	133	11.4	64.4	165	251	285
1893	—	1					.73		—															—	
1897	1908	12					—		1.16															*1.79	
1897	1919	23					—		*1.04										—					—	
1914	1919	6		—			—		.98										.99						
1926	1930	5		*.89	—		—	—	—	—	.96								1.01		—		—		
1932	1933	2		—	.85		*.93	.92		1.03	.91								1.00		1.06		1.06		
1914	1944	31			—		—	—		—	—								*.98		—		—		
1925	1944	20			—			—		—	.91								.96		—		—		
1930	1944	15			.82			—		—	.87								.92		—		1.00		
1931	1944	14			.84			.89		.96	.89								.94		—		1.00		
1932	1944	13			.88			.93		.99	.93						—		.98		1.04		1.04		
1933	1944	12			.92			.97		1.02	.97	—	—				1.07		1.02		1.08		1.08		
1939	1944	6			.69			.80		.93	.71	.75	.93				.86	—	.81		.92		.96		
1941	1944	4			.66			.77		.92	.65	.74	.92				.85	.80	.78		.88		.95		
1925	1952	28			—			—		—	*.98	—	—				—	—	—	[a]1.02	—		—		
1930	1952	23			*.90			—		—	.97	—	—				—	—		[a]1.01	—		*1.08		
1931	1952	22			.92			*.96		*.99	.98	—	—				—	—		[a]1.02	—		1.09		
1932	1952	21			.95			.98		1.01	1.01	—	—				—	—		[a]1.05	*1.14		1.12		
1933	1952	20			.97			1.01		1.02	1.04	—	—				*1.09	—		[a]1.08	1.17		1.15		
1939	1952	14			.90			.96		.99	.95	.96	*1.12				1.01	—		[a]1.01	1.13		1.12		
1941	1952	12	—		.93			.97		1.00	.98	.99	1.16		—	—	1.03	*1.03		[a]1.03	1.16		1.15		—
1945	1952	8	*.85	—	1.06	—	—	1.08	—	1.04	1.14	1.12	1.27	—	*1.09	*1.23	1.12	1.14	—	*1.16	1.30	—	1.25	—	*1.23
1949	1952	4	.93	—	1.20	*1.18	—	1.26	—	1.24	1.30	1.28	1.36	*1.34	1.27	1.43	1.28	1.30	—	1.35	1.43	*1.38	1.37	—	1.37

Station No. on map	19	15	21	14	23	16	17	18	25	26	24	13	7	6	11	12	9	10	3	2	1	4	5
Gaging station	Little Falls Branch	Great Seneca Creek	Rock Creek (Sherrill Drive)	Bennett Creek	Rock Creek ("Q" St.)	Seneca Creek	Potomac River (Great Falls)	Potomac River (Washington)	Northwest Branch Anacostia River (Colesville)	Northwest Branch Anacostia River (Hyattsville)	Northeast Branch Anacostia River	Dorsey Run	Cattail Creek	Patuxent River (Unity)	Little Patuxent River (Guilford)	Little Patuxent River (Savage)	Patuxent River (Burtonsville)	Patuxent River (Laurel)	Piney Run	South Branch Patapsco River	North Branch Patapsco River	Patapsco River (Woodstock)	Patapsco River (Hollofield)

* = longest period of record (all records adjusted for regulation or diversion).

ª = based on Burtonsville with drainage area ratio.

The changes on the Patuxent River illustrate the history of stream gaging. The earliest gaging station at Burtonsville operated with natural flow for 27 years prior to August 1939, at which time the initial diversion began at Mink Hollow with pumpage from the Patuxent River basin into the Northwest Branch Anacostia River basin. Upstream storage in Triadelphia Lake began in June 1942 so that the Burtonsville station was discontinued in February 1945 after 32 years of record. It was replaced in October 1944 by a new stream-gaging station near Laurel just downstream from the Rocky Gorge Pumping Station to measure the remaining streamflow in the Patuxent River after diversion to the Willis School Filtration Plant. This diversion may be increased after May 1954 by the additional storage in Rocky Gorge Reservoir and streamflow further affected by an even greater degree of regulation of the Patuxent River. Farther downstream the town of Laurel will soon build a $0.4 million sewage treatment plant, which contrary to most developments, should improve rather than impair the quality of the water reaching Chesapeake Bay. The Washington Suburban Sanitary Commission is required to maintain the flow passing the Laurel gaging station at 10 mgd (15.5 cfs) for proper dilution of sewage from Laurel.

The monthly pumpage at Mink Hollow from the Patuxent River is known, permitting an adjustment to obtain natural flow at the Colesville gaging station. The next downstream gaging station near Hyattsville can likewise be adjusted on a monthly basis for this Patuxent River inflow, together with outflow pumpage at Burnt Mills for water-supply, and the computed storage equivalent due to the change in reservoir contents at Burnt Mills. The adjustments for the Patuxent River at Laurel involve the Mink Hollow outflow pumpage, computed storage equivalent due to change in contents of Triadelphia Reservoir, and the outflow pumpage from Rocky Gorge to the Willis School Filtration Plant. The Potomac River near Washington, D. C., has highly complex adjustments with diversions and numerous storage equivalents, some of which are unknown and at indeterminate time-of-travel intervals upstream. Such complex flow disturbances preclude a rigorous determination of natural flow. The storage and diversion details are presented in the respective gaging-station "Remarks" paragraph in the section on "Discharge Records."

QUALITY OF WATER

POLLUTION

Streams, lakes and coastal waters have played such a vital role in the development of Maryland that a concerted effort should be made to control their legitimate use by maintaining a satisfactory standard of quality. Rivers and other bodies of water can handle a reasonable amount of waste materials, converting them through chemical and biological action into stable compounds that will not cause nuisances or into products suitable for re-use by animal and

TABLE 22

Raw-Water Analyses Compiled by U.S. Geological Survey Quality of Water Branch

(parts per million)

River basin	Potomac				Northwest Branch Anacostia		Patuxent		
Sample from Filtration Plant	Dalecarlia				R. B. Morse		—	Willis School	
Date of collection	1906 to 1911[a]	May 1950[b]	August 1950[b]	1950[c]	1949[d]	1950[d]	1911 to 1912[e]	1950[f]	April 9, 1951[f]
Silica (SiO_2)		5.5	4.4	5.5					9.7
Iron (Fe) in solution		.04	.07	.05					.02
Alkalinity, range						10–26		8–22	
average						20		14	
Calcium (Ca)		22	30	25					4.0
Magnesium (Mg)		3.8	9.4	5.2					1.1
Sodium (Na)		1.9							2.6
Potassium (K)									1.2
Bicarbonate (HCO_3)		56	100	71					15
Sulfate (SO_4)		22	42	32					4.0
Chloride (Cl)		3.5	8.1	3.8					3.2
Nitrate (NO_3)		1.1	.9	1.0					1.9
Sum (Dissolved solids)		86	144	108	92				
Residue on evaporation		133	149	139				(180°C)→	37
Hardness, range	31–128					16–35	14–26	15–25	
average	71				14	22	19	18	
as $CaCO_3$		70	114	84					14
as non-carbonate		25	32	26					2
Specific conductance, micromhos								(25°C)→	54.6
pH		7.5	7.8	7.7		6.1–7.6		6.0–7.4	6.8
Color									2

[a] From 1912 Report by Allen Hazen, Consulting Engineer to the Corps of Engineers, U. S. Army.

[b] Monthly analysis of composite of daily samples by Supply Division of District of Columbia Water System.

[c] Average of monthly analyses by Supply Division of District of Columbia Water System.

[d] Average of analyses by Washington Suburban Sanitary Commission.

[e] Average of 12 analyses from Sept. 6, 1911 to May 14, 1912 in 1912 Report by Allen Hazen.

[f] Analyses by U. S. Geological Survey.

plant life. Nature's processes, however, are not always capable or efficient enough to provide a safe water supply at random locations along a stream.

The Maryland State Department of Health has actively pointed the way for pollution improvements. During the period from 1937 to 1947 the control of pollution was the function of the Department of Tidewater Fisheries and the Department of Game and Inland Fish. In June 1, 1947, the Water Pollution Control Commission was created. Much progress has been accomplished in the disposal of industrial wastes and in the improvement of harbors, and recommendations have been made to inland municipalities where they have exceeded the waste-carrying capacities of their streams. This excess does not occur where rural population is scattered along the course of streams so that the full enjoyment of the stream is seldom impaired.

CHEMICAL ANALYSES

Little information is available about the quality of surface waters in Howard or Montgomery Counties. The chemical quality and sediment content of surface water vary with rainfall, geology, use of the land and water resources, and the climatic season. In general, the surface waters are known to have low concentrations of dissolved solids as well as comparatively low hardness. On the Northwest Branch Anacostia River average values for 1949 were 92 parts per million dissolved solids and 14 parts per million hardness (Table 22). Although sedimentation is a problem in many of the streams, continuous records of sediment discharge are not available for estimating the loads of sediment transported by the streams.

Twelve water analyses of the Patuxent River made by a consulting engineering firm during 1911 to 1912 show hardness averaging about 19 parts per million. Frequent analyses of the Potomac River near Washington during 1906 to 1911 show hardness averaging 71 parts per million. The relative value of the Patuxent River water, therefore, would be higher with at least 50 parts per million less hardness.

DISCHARGE RECORDS

Discharge records by calendar months prior to October 1943 are published in Bulletin 1, Maryland Department of Geology, Mines and Water Resources. Similar continued or new records follow for the water years 1944–52 and for some earlier periods that were not included in Bulletin 1.

1. North Branch Patapsco River near Marriottsville

Location—Water-stage recorder, lat. 39°21′56″, long. 76°53′06″, on left bank at downstream side of highway bridge 1.2 miles northeast of Marriottsville, Howard County, and 2.3 miles upstream from confluence with South Branch. Datum of gage is 269.78 feet above mean sea level (city of Baltimore bench mark).

Drainage area.—165 square miles.

Records available.—October 1929 to September 1952. (Oct. 1–27, 1929 estimated to obtain monthly discharge.)

Average discharge.—23 water years, (1930–52) 179 second-feet.

Extremes.—Maximum discharge, 19,500 second-feet Aug. 24, 1933 (gage height, 20.8 feet), from rating curve extended above 2,700 second-feet on basis of velocity-area studies; minimum, 6 second-feet Sept. 29, 1941; minimum daily, 9 second-feet Sept. 30, 1941.

Remarks.—Records good except those for periods of ice effect, fragmentary or no gage-height record, or shifting control, which are fair. Some diurnal fluctuation at low and medium flow caused by power plants above station. Construction of Liberty Dam had no effect on discharge records in this report as diversion for water-supply purposes did not begin until Feb. 26, 1953. Records do not include small amount of water diverted above station into Monocacy River basin for municipal supply of Westminster.

Monthly discharge of North Branch Patapsco River near Marriottsville

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1943–44						
October	674	36	97.4	0.590	0.68	0.381
November	2,790	79	219	1.33	1.48	.860
December	694	55	104	.630	.73	.407
January	3,540	80	291	1.76	2.04	1.14
February	188	80	120	.727	.78	.470
March	983	116	300	1.82	2.10	1.18
April	476	180	258	1.56	1.74	1.01
May	810	126	210	1.27	1.46	.821
June	326	88	137	.830	.92	.536
July	107	44	65.9	.399	.46	.258
August	163	28	48.4	.293	.34	.189
September	223	24	61.9	.375	.42	.242
The year	3,540	24	159	.964	13.15	.623
1944–45						
October	290	54	81.1	0.492	0.57	0.318
November	298	43	81.0	.491	.55	.317
December	954	65	145	.879	1.01	.568
January	737	77	156	.945	1.09	.611
February	700	77	299	1.81	1.89	1.17
March	380	118	188	1.14	1.31	.737
April	538	97	161	.976	1.09	.631
May	243	86	134	.812	.93	.525
June	419	58	107	.648	.73	.419
July	1,980	51	297	1.80	2.07	1.16
August	1,040	97	198	1.20	1.39	.776
September	1,060	86	201	1.22	1.36	.789
The year	1,980	43	170	1.03	13.99	.666

Monthly discharge of North Branch Patapsco River near Marriottsville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1945–46						
October	266	118	141	0.855	0.98	0.553
November	1,020	108	201	1.22	1.36	.789
December	1,010	150	294	1.78	2.06	1.15
January	427	170	257	1.56	1.79	1.01
February	552	155	226	1.37	1.43	.885
March	359	180	225	1.36	1.57	.879
April	202	132	153	.927	1.04	.599
May	1,110	118	228	1.38	1.59	.892
June	4,370	132	391	2.37	2.64	1.53
July	605	109	214	1.30	1.49	.840
August	1,640	118	253	1.53	1.77	.989
September	902	90	163	.988	1.10	.639
The year	4,370	90	229	1.39	18.82	.898
1946–47						
October	264	105	134	0.812	0.94	0.525
November	160	98	113	.685	.76	.443
December	413	82	123	.745	.86	.482
January	509	123	187	1.13	1.31	.730
February	184	80	137	.830	.86	.536
March	560	125	197	1.19	1.38	.769
April	205	120	142	.861	.96	.556
May	764	123	221	1.34	1.54	.866
June	774	105	171	1.04	1.15	.672
July	274	74	117	.709	.82	.458
August	330	58	91.5	.555	.64	.359
September	88	46	64.6	.392	.44	.253
The year	774	46	142	.861	11.66	.556
1947–48						
October	152	46	57.9	0.351	0.40	0.227
November	653	59	163	.988	1.10	.639
December	178	72	93.3	.565	.65	.365
January	1,460	74	214	1.30	1.50	.840
February	1,300	74	288	1.75	1.88	1.13
March	406	169	232	1.41	1.62	.911
April	571	156	229	1.39	1.55	.898
May	1,270	178	319	1.93	2.23	1.25
June	1,110	181	325	1.97	2.20	1.27
July	671	130	209	1.27	1.46	.821
August	306	94	147	.891	1.03	.576
September	151	74	90.1	.546	.61	.353
The year	1,460	46	197	1.19	16.23	.769

Monthly discharge of North Branch Patapsco River near Marriottsville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948–49						
October	286	76	113	0.685	0.79	0.443
November	738	78	166	1.01	1.12	.653
December	1,860	158	335	2.03	2.34	1.31
January	1,320	251	445	2.70	3.11	1.75
February	542	328	395	2.39	2.49	1.54
March	750	258	312	1.89	2.18	1.22
April	539	230	302	1.83	2.04	1.18
May	573	181	260	1.58	1.81	1.02
June	220	110	143	.867	.97	.560
July	1,790	90	196	1.19	1.37	.769
August	166	78	104	.630	.73	.407
September	130	62	76.5	.464	.52	.300
The year	1,860	62	237	1.44	19.47	.931
1949–50						
October	254	66	93.7	0.568	0.65	.367
November	145	74	90.3	.547	.61	.354
December	410	72	128	.776	.90	.502
January	191	82	103	.624	.72	.403
February	498	125	229	1.39	1.45	.898
March	1,380	105	266	1.61	1.86	1.04
April	238	157	184	1.12	1.24	.724
May	344	133	196	1.19	1.37	.769
June	497	96	165	1.00	1.12	.646
July	423	81	126	.764	.88	.494
August	212	55	75.1	.455	.52	.294
September	708	56	160	.970	1.08	.627
The year	1,380	55	151	.915	12.40	.591
1950–51						
October	420	83	116	.703	.81	.454
November	1,200	98	186	1.13	1.26	.730
December	1,370	130	296	1.79	2.07	1.16
January	750	155	223	1.35	1.56	.873
February	1,100	240	400	2.42	2.52	1.56
March	588	222	274	1.66	1.91	1.07
April	399	188	241	1.46	1.63	.944
May	317	131	176	1.07	1.23	.692
June	1,050	134	318	1.93	2.15	1.25
July	800	109	170	1.03	1.18	.666
August	349	70	112	.679	.78	.439
September	205	62	85.5	.518	.58	.335
The year	1,370	62	215	1.30	17.68	.840

Monthly discharge of North Branch Patapsco River near Marriottsville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	117	54	74.3	.450	.52	.291
November	637	92	167	1.01	1.13	.653
December	650	88	196	1.19	1.37	.769
January	597	216	316	1.92	2.21	1.24
February	644	194	269	1.63	1.76	1.05
March	1,220	200	358	2.17	2.50	1.40
April	3,810	251	615	3.73	4.16	2.41
May	3,060	332	634	3.84	4.43	2.48
June	686	219	322	1.95	2.17	1.26
July	1,030	148	256	1.55	1.79	1.00
August	409	124	179	1.08	1.25	.698
September	3,140	119	263	1.59	1.78	1.03
The year	3,810	54	304	1.84	25.07	1.19

Yearly discharge of North Branch Patapsco River near Marriottsville

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1930*	158	0.958	13.03	0.619	122	0.739	10.07	0.478
1931	75.8	.459	6.23	.297	73.4	.445	6.04	.288
1932	87.8	.532	7.24	.344	124	.752	10.22	.486
1933	262	1.59	21.56	1.03	245	1.48	20.19	.957
1934	164	.994	13.44	.642	175	1.06	14.40	.685
1935	188	1.14	15.49	.737	176	1.07	14.48	.692
1936	211	1.28	17.42	.827	208	1.26	17.16	.814
1937	195	1.18	16.09	.763	239	1.45	19.66	.937
1938	177	1.07	14.54	.692	133	.806	10.96	.521
1939	169	1.02	13.86	.659	167	1.01	13.73	.653
1940	154	.933	12.72	.603	167	1.01	13.82	.653
1941	139	.842	11.41	.544	113	.685	9.33	.443
1942	123	.745	10.13	.482	177	1.07	14.58	.692
1943	206	1.25	16.93	.808	174	1.05	14.29	.679
1944	159	.964	13.15	.623	150	.909	12.39	.588
1945	170	1.03	13.99	.666	198	1.20	16.26	.776
1946	229	1.39	18.82	.898	206	1.25	16.98	.808
1947	142	.861	11.66	.556	137	.830	11.25	.536
1948	197	1.19	16.23	.769	222	1.35	18.33	.873
1949	237	1.44	19.47	.931	211	1.28	17.38	.827
1950	151	.915	12.40	.591	175	1.06	14.38	.685
1951	215	1.30	17.68	.840	201	1.22	16.56	.789
1952	304	1.84	25.07	1.19	—	—	—	—
Highest	304	1.84	25.07	1.19	245	1.48	20.19	.957
Average	179	1.08	14.66	.698	172	1.04	14.12	.672
Lowest	75.8	.459	6.23	.297	73.4	.445	6.04	.288

* Oct. 1–27, 1929 estimated.

2. South Branch Patapsco River at Henryton

Location.—Water-stage recorder and concrete control, lat. 39°21′05″, long. 76°54′50″, on right bank at downstream side of bridge on State Highway 101 at Henryton, Carroll County, 1.3 miles upstream from Piney Run, 2.3 miles upstream from confluence with North Branch, and 3.2 miles southeast of Sykesville.

Drainage area.—64.4 square miles.

Records available.—August 1948 to September 1952.

Average discharge.—4 water years (1949–52), 89.1 second-feet.

Extremes.—Maximum discharge, 4,930 second-feet May 26, 1952 (gage height, 11.04 feet), from rating curve extended above 1,900 second-feet on basis of slope-area determination at gage height 7.88 feet; minimum, 15 second-feet Oct. 7, 1951 (gage height, 1.825 feet); minimum daily, 16 second-feet Oct. 6, 7, 1951.

Remarks.—Records excellent except those for periods of ice effect, or doubtful or no gage-height record, which are fair or good.

Monthly discharge of South Branch Patapsco River at Henryton

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948						
August 18–31	107	39	57.9	0.899	0.47	0.581
September	96	31	40.2	.624	.70	.403
1948–49						
October	140	31	49.7	0.772	0.89	0.499
November	375	37	72.1	1.12	1.25	.724
December	937	72	159	2.47	2.84	1.60
January	498	110	192	2.98	3.44	1.93
February	324	134	173	2.69	2.80	1.74
March	418	105	134	2.08	2.40	1.34
April	211	86	118	1.83	2.05	1.18
May	452	81	133	2.07	2.39	1.34
June	89	45	62.1	.964	1.08	.623
July	220	34	55.0	.854	.98	.552
August	93	28	37.5	.582	.67	.376
September	60	23	30.4	.472	.53	.305
The year	937	23	101	1.57	21.32	1.01
1949–50						
October	110	26	35.9	0.557	0.64	0.360
November	60	28	35.3	.548	.61	.354
December	180	27	50.2	.780	.90	.504
January	97	34	42.7	.663	.76	.429
February	224	52	100	1.55	1.62	1.00
March	593	44	105	1.63	1.88	1.05
April	92	60	70.9	1.10	1.23	.711
May	230	56	84.4	1.31	1.51	.847
June	200	39	66.8	1.04	1.16	.672
July	115	30	45.1	.700	.81	.452
August	94	19	26.5	.411	.47	.266
September	512	20	66.8	1.04	1.16	.672
The year	593	19	60.5	.939	12.75	.607

Monthly discharge of South Branch Patapsco River at Henryton—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950–51						
October	163	33	45.6	0.708	0.82	0.458
November	968	36	79.2	1.23	1.37	.795
December	631	53	113	1.75	2.02	1.13
January	202	60	81.6	1.27	1.46	.821
February	642	86	156	2.42	2.52	1.56
March	208	84	104	1.61	1.87	1.04
April	138	71	90.9	1.41	1.58	.911
May	116	48	67.4	1.05	1.21	.679
June	401	45	129	2.00	2.23	1.29
July	102	40	57.5	.893	1.03	.577
August	59	21	33.0	.512	.59	.331
September	53	17	24.9	.387	.43	.250
The year	968	17	81.2	1.26	17.13	.814
1951–52						
October	34	16	21.2	0.329	0.38	0.213
November	180	30	50.9	.790	.88	.511
December	240	29	67.1	1.04	1.20	.672
January	225	73	110	1.71	1.98	1.11
February	248	71	96.5	1.50	1.62	.969
March	286	73	114	1.77	2.04	1.14
April	2,070	86	254	3.94	4.40	2.55
May	1,630	116	254	3.94	4.54	2.55
June	326	73	124	1.93	2.14	1.25
July	628	53	119	1.85	2.12	1.20
August	241	45	67.1	1.04	1.20	.672
September	1,050	40	88.9	1.38	1.54	.892
The year	2,070	16	114	1.77	24.04	1.14

Yearly discharge of South Branch Patapsco River at Henryton

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1949	101	1.57	21.32	1.01	87.7	1.36	18.49	0.879
1950	60.5	.939	12.75	.607	70.3	1.09	14.81	.704
1951	81.2	1.26	17.13	.814	72.9	1.13	15.38	.730
1952	114	1.77	24.04	1.14				
Highest	114	1.77	24.04	1.14	87.7	1.36	18.49	.879
Average	89.1	1.38	18.73	.892	77.0	1.20	16.29	.776
Lowest	60.5	.939	12.75	.607	70.3	1.09	14.81	.704

PATAPSCO RIVER BASIN

3. Piney Run near Sykesville

Location.—Water-stage recorder and concrete control, lat. 39°22′55″, long. 76°58′00″, on left bank 75 feet downstream from highway bridge on Md. 32, 1¼ miles north of Sykesville, Carroll County, and 5¼ miles upstream from mouth.

Drainage area.—11.4 square miles.

Records available.—September 1931 to September 1952.

Average discharge.—21 water years (1932–52), 13.0 second-feet.

Extremes.—Maximum discharge recorded, 2,100 second-feet July 24, 1946 (gage height, 6.95 feet) from rating curve extended above 260 second-feet on basis of slope-area determinations at gage heights 4.16, 4.88, 5.39, 5.76, 6.04 and 6.95 feet; minimum, 0.4 second-foot Jan. 25, 1939; minimum daily, 1.2 second-feet Sept. 17–21, 25, 26, 1932.

Remarks.—Records good except those for periods of ice effect, or doubtful, or fragmentary or no gage-height record, which are fair.

Monthly discharge of Piney Run near Sykesville

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1943–44						
October	38	2.4	4.85	0.425	0.49	0.275
November	232	4.5	17.9	1.57	1.75	1.01
December	100	3.7	8.79	.771	.89	.498
January	514	5.0	26.6	2.33	2.69	1.51
February	12	5.4	7.55	.662	.71	.428
March	83	7.7	18.7	1.64	1.90	1.06
April	33	10	15.5	1.36	1.52	.879
May	59	7.4	12.8	1.12	1.29	.724
June	95	5.4	11.1	.974	1.08	.630
July	6.8	2.6	4.11	.361	.42	.233
August	11	2.0	3.10	.272	.31	.176
September	23	2.2	4.58	.402	.45	.260
The year	514	2.0	11.3	.991	13.50	.641
1944–45						
October	18	3.5	5.33	0.468	0.54	0.302
November	23	3.9	5.52	.484	.54	.313
December	69	5.0	10.4	.912	1.05	.589
January	95	5.0	11.1	.974	1.13	.630
February	67	5.1	20.6	1.81	1.88	1.17
March	25	8.4	12.4	1.09	1.25	.704
April	46	7.1	10.7	.939	1.05	.607
May	16	6.0	8.59	.754	.87	.487
June	31	3.7	7.31	.641	.72	.414
July	113	3.5	19.7	1.73	1.99	1.12
August	98	6.3	13.3	1.17	1.35	.756
September	98	5.7	15.3	1.34	1.50	.866
The year	113	3.5	11.6.	1.02	13.87	.659

Monthly discharge of Piney Run near Sykesville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1945–46						
October	21	8.0	9.77	0.857	0.99	0.554
November	130	7.7	15.0	1.32	1.47	.853
December	98	10	21.2	1.86	2.15	1.20
January	26	12	17.2	1.50	1.74	.969
February	41	11	16.3	1.43	1.49	.924
March	28	12	15.5	1.35	1.56	.873
April	14	8.2	10.2	.895	1.00	.578
May	47	7.1	13.6	1.19	1.38	.769
June	412	7.8	28.3	2.48	2.77	1.60
July	318	5.6	20.1	1.76	2.03	1.14
August	198	6.2	15.5	1.36	1.56	.879
September	99	4.5	10.2	.895	1.00	.578
The year	412	4.5	16.1	1.41	19.14	.911
1946–47						
October	20	5.6	7.65	0.671	0.77	0.434
November	8.8	5.6	6.35	.557	.62	.360
December	36	4.7	7.25	.636	.73	.411
January	49	6.8	11.7	1.03	1.19	.666
February	10	5.1	7.86	.689	.72	.445
March	50	6.8	12.5	1.10	1.27	.711
April	34	6.2	9.04	.793	.88	.513
May	106	7.1	20.2	1.77	2.04	1.14
June	156	7.1	16.4	1.44	1.61	.931
July	15	4.9	7.61	.668	.77	.432
August	85	3.7	10.7	.939	1.08	.607
September	11	4.5	5.50	.482	.54	.312
The year	156	3.7	10.3	.904	12.22	.584
1947–48						
October	6.5	3.7	4.32	0.379	0.44	0.245
November	71	5.1	13.3	1.17	1.31	.756
December	13	5.0	6.56	.575	.66	.372
January	154	6.0	16.4	1.44	1.66	.931
February	191	5.8	24.1	2.11	2.28	1.36
March	40	12	16.1	1.41	1.63	.911
April	44	11	16.2	1.42	1.59	.918
May	60	11	19.0	1.67	1.92	1.08
June	185	10	28.5	2.50	2.79	1.62
July	44	9.5	15.7	1.38	1.58	.892
August	31	6.8	12.7	1.11	1.28	.717
September	20	6.2	7.50	.658	.73	.425
The year	191	3.7	15.0	1.32	17.87	.853

Monthly discharge of Piney Run near Sykesville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948–49						
October	26	6.2	9.95	0.873	1.01	0.564
November	62	7.4	14.0	1.23	1.37	.795
December	224	13	30.9	2.71	3.13	1.75
January	141	18	31.7	2.78	3.21	1.80
February	36	22	26.8	2.35	2.45	1.52
March	101	17	24.5	2.15	2.48	1.39
April	41	15	20.1	1.76	1.96	1.14
May	116	15	25.4	2.23	2.57	1.44
June	18	8.2	11.1	.974	1.09	.630
July	40	5.9	9.58	.840	.97	.543
August	17	5.1	6.55	.575	.66	.372
September	8.0	4.1	5.18	.454	.51	.293
The year	224	4.1	18.0	1.58	21.41	1.02
1949–50						
October	23	5.0	7.27	0.638	0.74	0.412
November	14	5.5	6.75	.592	.66	.383
December	33	5.5	9.62	.844	.97	.545
January	19	6.4	7.99	.701	.81	.453
February	38	8.6	16.2	1.42	1.48	.918
March	99	7.4	18.1	1.59	1.83	1.03
April	14	10	12.0	1.05	1.17	.679
May	163	9.4	18.2	1.60	1.84	1.03
June	32	7.3	12.2	1.07	1.20	.692
July	47	6.7	10.6	.930	1.07	.601
August	21	4.6	6.27	.550	.63	.335
September	162	5.0	16.6	1.46	1.62	.944
The year	163	4.6	11.8	1.04	14.02	.672
1950–51						
October	45	7.3	10.5	0.921	1.06	0.595
November	148	8.0	14.4	1.26	1.40	.814
December	138	10	21.1	1.85	2.13	1.20
January	47	12	16.0	1.40	1.61	.905
February	144	15	28.7	2.52	2.62	1.63
March	37	15	18.6	1.63	1.88	1.05
April	26	12	16.4	1.44	1.61	.931
May	22	8.6	12.2	1.07	1.23	.692
June	95	7.4	22.5	1.97	2.21	1.27
July	17	6.8	9.96	.874	1.01	.565
August	14	4.7	6.54	.574	.66	.371
September	12	4.3	5.93	.520	.58	.336
The year	148	4.3	15.1	1.32	18.00	.853

Monthly discharge of Piney Run near Sykesville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	6.2	4.1	4.87	.427	.49	.276
November	48	5.6	11.2	.982	1.10	.635
December	52	5.4	12.7	1.11	1.29	.717
January	51	13	21.1	1.85	2.13	1.20
February	50	13	17.9	1.57	1.69	1.01
March	89	14	22.3	1.96	2.26	1.27
April	351	15	43.4	3.81	4.24	2.46
May	235	22	45.3	3.97	4.58	2.57
June	41	14	21.2	1.86	2.08	1.20
July	69	9.5	17.8	1.56	1.80	1.01
August	33	7.4	10.9	.956	1.11	.618
September	182	6.8	15.3	1.34	1.50	.866
The year	351	4.1	20.3	1.78	24.27	1.15

Yearly discharge of Piney Run near Sykesville

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1932	6.21	0.545	7.41	0.352	8.68	0.761	10.36	0.492
1933	17.9	1.57	21.34	1.01	16.9	1.48	20.08	.957
1934	11.3	.991	13.50	.641	11.9	1.04	14.23	.672
1935	13.5	1.18	16.01	.763	13.0	1.14	15.53	.737
1936	15.4	1.35	18.42	.873	15.0	1.32	17.90	.853
1937	13.8	1.21	16.43	.782	16.7	1.46	19.88	.944
1938	13.4	1.18	15.96	.763	10.7	.939	12.81	.607
1939	12.4	1.09	14.76	.704	12.0	1.05	14.25	.679
1940	10.5	.921	12.49	.595	11.2	.982	13.42	.635
1941	8.80	.772	10.48	.499	7.20	.632	8.57	.408
1942	7.62	.668	9.08	.432	11.0	.965	13.17	.624
1943	12.3	1.08	14.70	.698	10.7	.939	12.77	.607
1944	11.3	.991	13.50	.641	10.5	.921	12.50	.595
1945	11.6	1.02	13.87	.659	13.7	1.20	16.35	.776
1946	16.1	1.41	19.14	.911	14.0	1.23	16.65	.795
1947	10.3	.904	12.22	.584	10.5	.921	12.51	.595
1948	15.0	1.32	17.87	.853	17.6	1.54	20.97	.995
1949	18.0	1.58	21.41	1.02	15.3	1.34	18.27	.866
1950	11.8	1.04	14.02	.672	13.6	1.19	16.24	.769
1951	15.1	1.32	18.00	.853	13.7	1.20	16.29	.776
1952	20.3	1.78	24.27	1.15				
Highest	20.3	1.78	24.27	1.15	17.6	1.54	20.97	.995
Average	13.0	1.14	15.48	.737	12.7	1.11	15.07	.717
Lowest	6.21	.545	7.41	.352	7.20	.632	8.57	.408

PATAPSCO RIVER BASIN

4. Patapsco River at Woodstock

Location.—Chain gage, lat. 39°19′52″, long. 76°52′23″, on upstream side of highway bridge at Woodstock, Howard County, 1.7 miles downstream from confluence of North and South Branches. Prior to Nov. 11, 1903 a wire-weight gage at same site and datum.

Drainage area.—251 square miles.

Records available.—August 1896 to March 1909. (Discontinued)

Average discharge.—7 water years (1897–1908), 450 second-feet.

Extremes.—Maximum daily discharge, 11,000 second-feet Feb. 26, 1908 (gage height, 14.9 feet); minimum daily, 50 second-feet July 17, 21, Aug. 7–9, 12, 14–16, 18, 1900, June 25, Sept. 11, 1904.

Remarks.—Low and medium flow regulated by operation of mills above station. Conditions of flow relatively permanent, although subject to change at times of extreme flood. Winter discharge affected by ice. Streambed and banks are mostly of rock and very little of the land is subject to overflow.

Yearly discharge of Patapsco River at Woodstock

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1897	360	1.43	19.47	0.924	417	1.66	22.67	1.07
1898	323	1.29	17.58	.834	—	—	—	—
1902	489	1.95	26.53	1.26	476	1.90	25.74	1.23
1903	679	2.71	36.73	1.75	645	2.57	34.88	1.66
1906	441	1.76	23.81	1.14	464	1.85	25.10	1.20
1907	421	1.68	22.82	1.09	397	1.58	21.46	1.02
1908	439	1.75	23.80	1.13	404	1.61	21.90	1.04
Highest	679	2.71	36.73	1.75	645	2.57	34.88	1.66
Average	450	1.79	24.30	1.16	467	1.86	25.25	1.20
Lowest	323	1.29	17.58	.834	397	1.58	21.46	1.02

PATAPSCO RIVER BASIN

5. Patapsco River at Hollofield

Location.—Water-stage recorder, lat. 39°18′36″, long. 76°47′39″, on right bank at downstream side of highway bridge at Hollofield, Howard County, 0.3 mile downstream from Dogwood Run and 3.0 miles north of Ellicott City.

Drainage are.—285 square miles.

Records available.—May 1944 to September 1952.

Average discharge.—8 water years, 351 second-feet.

Extremes.—Maximum discharge, 13,500 second-feet June 2, 1946 (gage height, 11.62 feet); minimum, 6 second-feet Sept. 6, 1944 (gage height, 0.83 foot); minimum daily, 32 second-feet Sept. 10, 1944.

Flood of August 1933 reached a stage of 19.5 feet, from information by Maryland State Roads Commission.

Remarks.—Records excellent except those for periods of fragmentary gage-height record, which are good, and those for periods of no gage height record or ice effect, which are fair. Flow regulated by mills above station. Construction of Liberty Dam had no effect on discharge records in this report as diversion for water-supply purposes did not begin until Feb. 26, 1953.

Monthly discharge of Patapsco River at Hollofield

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1944						
May 22-31	362	194	251	0.881	0.33	0.569
June	1,170	150	248	.870	.97	.562
July	193	52	111	.389	.45	.251
August	294	34	76.2	.267	.31	.173
September	339	32	102	.358	.40	.231
1944-45						
October	499	92	136	0.477	0.55	0.308
November	494	90	136	.477	.53	.308
December	1,610	130	258	.905	1.04	.585
January	1,940	140	298	1.05	1.20	.679
February	1,070	140	480	1.68	1.75	1.09
March	672	208	332	1.16	1.34	.750
April	876	190	284	.996	1.11	.644
May	426	145	235	.825	.95	.533
June	643	89	176	.618	.69	.399
July	4,290	88	534	1.87	2.16	1.21
August	2,910	162	351	1.23	1.42	.795
September	1,750	136	322	1.13	1.26	.730
The year	4,290	88	294	1.03	14.00	.666

Monthly discharge of Patapsco River at Hollofield—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1945–46						
October	426	183	224	0.786	0.91	0.508
November	1,880	174	341	1.20	1.33	.776
December	2,240	240	520	1.82	2.10	1.18
January	856	290	445	1.56	1.80	1.01
February	906	260	397	1.39	1.45	.898
March	619	312	391	1.37	1.58	.885
April	356	205	253	.888	.99	.574
May	1,890	178	375	1.32	1.52	.853
June	8,670	219	688	2.41	2.69	1.56
July	1,510	163	352	1.24	1.42	.801
August	2,890	180	392	1.38	1.59	.892
September	1,790	114	246	.863	.96	.558
The year	8,670	114	385	1.35	18.34	.873
1946–47						
October	366	150	198	0.695	0.80	0.449
November	250	146	168	.589	.66	.381
December	590	127	186	.653	.75	.442
January	705	170	291	1.02	1.18	.659
February	303	101	221	.775	.81	.501
March	775	220	306	1.07	1.24	.692
April	350	176	213	.747	.84	.483
May	1,420	182	393	1.38	1.59	.892
June	1,370	184	301	1.06	1.18	.685
July	480	122	202	.709	.82	.458
August	681	87	162	.568	.65	.367
September	148	75	102	.358	.40	.231
The year	1,420	75	229	.804	10.92	.520
1947–48						
October	263	68	91.0	0.319	0.37	0.206
November	1,190	93	267	.937	1.05	.606
December	267	120	144	.505	.58	.316
January	2,410	130	381	1.34	1.54	.866
February	2,310	125	516	1.81	1.95	1.17
March	728	286	396	1.39	1.60	.898
April	947	275	408	1.43	1.60	.924
May	1,930	301	534	1.87	2.16	1.21
June	1,800	289	577	2.02	2.26	1.31
July	1,160	223	352	1.24	1.42	.801
August	537	167	267	.937	1.08	.606
September	332	139	165	.579	.65	.374
The year	2,410	68	341	1.20	16.26	.776

PATAPSCO RIVER BASIN—*Continued*

Monthly discharge of Patapsco River at Hollofield—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948–49						
October	605	141	200	0.702	0.81	0.454
November	1,570	157	311	1.09	1.22	.704
December	3,420	254	607	2.13	2.46	1.38
January	2,360	419	770	2.70	3.12	1.75
February	1,110	574	717	2.52	2.62	1.63
March	1,420	437	559	1.96	2.26	1.27
April	938	389	527	1.85	2.06	1.20
May	1,180	339	500	1.75	2.02	1.13
June	395	194	250	.877	.98	.567
July	2,270	152	295	1.04	1.20	.672
August	284	113	158	.554	.64	.358
September	202	94	126	.442	.50	.286
The year	3,420	94	416	1.46	19.89	.944
1949–50						
October	443	114	154	0.540	0.62	0.349
November	264	122	148	.519	.58	.335
December	713	123	221	.775	.89	.501
January	325	143	175	.614	.71	.397
February	953	218	413	1.45	1.51	.937
March	2,420	176	454	1.59	1.84	1.03
April	389	241	290	1.02	1.14	.659
May	631	222	336	1.18	1.36	.763
June	1,040	160	281	.986	1.10	.637
July	720	139	234	.821	.95	.531
August	466	88	134	.470	.54	.304
September	1,570	95	303	1.06	1.18	.685
The year	2,420	88	261	.916	12.42	.592
1950–51						
October	758	135	205	0.719	0.83	0.465
November	2,650	163	331	1.16	1.30	.750
December	2,480	220	530	1.86	2.14	1.20
January	1,240	246	378	1.33	1.53	.860
February	2,630	420	724	2.54	2.65	1.64
March	1,020	366	465	1.63	1.88	1.05
April	684	307	409	1.44	1.60	.931
May	596	222	291	1.02	1.18	.659
June	2,020	204	545	1.91	2.13	1.23
July	893	183	272	.954	1.10	.617
August	428	118	177	.621	.72	.401
September	265	99	136	.477	.53	.308
The year	2,650	99	369	1.29	17.59	.834

PATAPSCO RIVER BASIN—*Continued*

Monthly discharge of Patapsco River at Hollofield—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	173	84	118	0.414	0.48	0.268
November	938	139	263	.923	1.03	.597
December	1,050	129	328	1.15	1.33	.743
January	1,040	344	531	1.86	2.15	1.20
February	1,170	312	445	1.56	1.68	1.01
March	1,750	334	577	2.02	2.33	1.31
April	7,450	401	1,071	3.76	4.19	2.43
May	6,120	544	1,102	3.87	4.46	2.50
June	1,010	356	546	1.92	2.14	1.24
July	2,030	246	465	1.63	1.88	1.05
August	809	194	297	1.04	1.20	.672
September	5,450	186	435	1.53	1.70	.989
The year	7,450	84	515	1.81	24.57	1.17

Yearly discharge of Patapsco River at Hollofield

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1945	294	1.03	14.00	0.666	341	1.20	16.22	0.776
1946	385	1.35	18.34	.873	340	1.19	16.21	.769
1947	229	.804	10.92	.520	225	.789	10.71	.510
1948	341	1.20	16.26	.776	393	1.38	18.75	.892
1949	416	1.46	19.89	.944	367	1.29	17.49	.834
1950	261	.916	12.42	.592	306	1.07	14.60	.692
1951	369	1.29	17.59	.834	339	1.19	16.16	.769
1952	515	1.81	24.57	1.17				
Highest	515	1.81	24.57	1.17	393	1.38	18.75	.892
Average	351	1.23	16.70	.795	330	1.16	15.75	.750
Lowest	229	.804	10.92	.520	225	.789	10.71	.510

6. Patuxent River near Unity

Location.—Water-stage recorder and concrete control, lat. 39°14′18″, long. 77°03′23″, on right bank of downstream side of bridge on State Highway 97, 0.6 mile upstream from Cattail Creek, 0.8 mile upstream from Triadelphia Reservoir, 1.1 miles northeast of Unity, Montgomery County, and 4.6 miles upstream from Brighton Dam. Datum of gage is 364.76 feet above mean sea level (Washington Suburban Sanitary Commission bench mark). Prior to Aug. 14, 1946, wire-weight gage at same site and datum read twice daily. Concrete control completed July 19, 1946.

Drainage area.—34.8 square miles.

Records available.—July 1944 to September 1952.

Average discharge.—8 water years (1945–52), 42.8 second-feet.

Extremes.—Maximum discharge, 8,060 second-feet Aug. 1, 1945 (gage height, 13.58 feet from crest-stage indicator), from rating curve extended above 320 second-feet on basis of slope-area determination and logarithmic plotting; minimum, 2.1 second-feet Aug. 25–28, 1944, (gage height, 1.59 feet).

Remarks.—Records good except those for periods of ice effect, or doubtful, or no gage-height record, which are fair.

Monthly discharge of Patuxent River near Unity

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1944						
July 20–31	11	3.8	5.59	0.161	0.07	0.104
August	20	2.1	6.39	.184	.21	.119
September	64	2.4	10.1	.290	.32	.187
1944–45						
October	58	8.0	13.5	0.388	0.45	0.251
November	59	8.0	14.6	.420	.47	.271
December	166	14	29.8	.856	.99	.553
January	247	14	35.8	1.03	1.19	.666
February	162	12	54.4	1.56	1.63	1.01
March	83	26	43.7	1.26	1.45	.814
April	200	20	36.1	1.04	1.16	.672
May	42	15	26.0	.747	.86	.483
June	174	11	27.9	.802	.90	.518
July	877	9.6	80.6	2.32	2.67	1.50
August	1,410	23	85.1	2.45	2.82	1.58
September	352	12	45.7	1.31	1.47	.847
The year	1,410	8.0	41.1	1.18	16.06	.763

Monthly discharge of Patuxent River near Unity—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1945–46						
October	49	22	27.2	0.782	0.90	0.505
November	381	21	45.0	1.29	1.44	.834
December	447	37	75.9	2.18	2.51	1.41
January	110	41	57.5	1.65	1.90	1.07[redacted]
February	112	39	53.1	1.53	1.59	.989
March	91	39	50.4	1.45	1.67	.937
April	48	27	33.7	.968	1.08	.626
May	117	26	41.0	1.18	1.36	.763
June	675	21	65.9	1.89	2.11	1.22
July	88	13	25.2	.724	.83	.468
August	39	11	15.7	.451	.52	.291
September	121	8.0	18.1	.520	.58	.336
The year	675	8.0	42.3	1.22	16.49	.789
1946–47						
October	32	11	14.5	0.417	0.48	0.270
November	22	12	14.3	.411	.46	.266
December	62	11	17.1	.491	.57	.317
January	97	18	30.3	.871	1.00	.563
February	26	14	19.6	.563	.59	.364
March	109	17	32.8	.943	1.09	.609
April	34	17	22.3	.641	.72	.414
May	213	21	43.4	1.25	1.44	.808
June	124	15	28.1	.807	.90	.522
July	70	12	20.7	.595	.69	.385
August	195	9.0	24.3	.698	.80	.451
September	22	7.0	10.1	.290	.32	.187
The year	213	7.0	23.2	.667	9.06	.431
1947–48						
October	16	5.8	7.04	0.202	0.23	0.131
November	134	8.0	30.0	.862	.96	.557
December	33	15	18.7	.537	.62	.347
January	334	19	45.1	1.30	1.49	.840
February	380	19	65.3	1.88	2.03	1.22
March	117	35	52.2	1.50	1.73	.969
April	136	36	53.1	1.53	1.70	.989
May	149	32	52.3	1.50	1.73	.969
June	110	22	40.3	1.16	1.29	.750
July	89	16	23.8	.684	.79	.442
August	71	16	27.7	.796	.92	.514
September	59	15	20.3	.583	.65	.377
The year	380	5.8	36.2	1.04	14.14	.672

Monthly discharge of Patuxent River near Unity—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948–49						
October	76	17	25.3	0.727	0.84	0.470
November	220	19	42.4	1.22	1.36	.787
December	667	44	106	3.05	3.52	1.97
January	383	55	115	3.30	3.79	2.13
February	201	69	95.6	2.75	2.86	1.78
March	278	50	71.8	2.06	2.38	1.33
April	121	43	61.3	1.76	1.96	1.14
May	127	33	52.8	1.52	1.75	.982
June	35	20	25.6	.736	.82	.476
July	114	16	31.2	.897	1.03	.580
August	130	14	25.0	.718	.83	.464
September	30	11	16.8	.483	.54	.312
The year	667	11	55.6	1.60	21.68	1.03
1949–50						
October	88	12	19.6	0.563	0.65	0.364
November	45	15	19.5	.560	.63	.362
December	130	17	32.8	.943	1.09	.609
January	64	22	26.9	.773	.89	.500
February	190	33	67.0	1.93	2.01	1.25
March	503	28	71.7	2.06	2.38	1.33
April	56	33	40.5	1.16	1.30	.750
May	102	29	43.0	1.24	1.43	.801
June	77	16	30.1	.865	.96	.559
July	38	11	18.2	.523	.60	.338
August	44	7.4	11.3	.325	.37	.210
September	158	11	27.2	.782	.87	.505
The year	503	7.4	33.8	.971	13.18	.628
1950–51						
October	92	12	20.6	0.592	0.68	0.383
November	696	15	43.4	1.25	1.39	.808
December	484	24	62.7	1.80	2.08	1.16
January	90	28	38.2	1.10	1.27	.711
February	399	42	89.6	2.57	2.68	1.66
March	122	43	55.0	1.58	1.82	1.02
April	113	36	49.9	1.43	1.60	.924
May	126	26	40.6	1.17	1.34	.756
June	496	23	95.3	2.74	3.06	1.77
July	92	23	35.8	1.03	1.19	.666
August	22	11	16.4	.471	.54	.304
September	27	9.4	12.5	.359	.40	.232
The year	696	9.4	46.3	1.33	18.05	.860

PATUXENT RIVER BASIN—*Continued*

Monthly discharge of Patuxent River near Unity—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	20	8.4	10.9	0.313	0.36	0.202
November	112	14	27.3	.784	.87	.507
December	107	14	32.7	.940	1.08	.608
January	134	36	59.1	1.70	1.96	1.10
February	183	34	51.4	1.48	1.59	.956
March	133	38	57.9	1.66	1.92	1.07
April	1,160	43	150	4.31	4.81	2.79
May	986	56	141	4.05	4.66	2.62
June	189	41	72.9	2.09	2.34	1.35
July	366	28	62.0	1.78	2.06	1.15
August	134	19	33.0	.948	1.09	.613
September	1,280	20	70.8	2.03	2.27	1.31
The year	1,280	8.4	63.9	1.84	25.01	1.19

Yearly discharge of Patuxent River near Unity

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1944	—	—	—	—	—	—	—	—
1945	41.1	1.18	16.06	0.763	48.7	1.40	19.00	0.905
1946	42.3	1.22	16.49	.789	33.7	.968	13.15	.626
1947	23.2	.667	9.06	.431	24.0	.690	9.36	.446
1948	36.2	1.04	14.14	.672	46.1	1.32	18.05	.853
1949	55.6	1.60	21.68	1.03	47.0	1.35	18.33	.873
1950	33.8	.971	13.18	.628	38.4	1.10	14.96	.711
1951	46.3	1.33	18.05	.860	41.6	1.20	16.21	.776
1952	63.9	1.84	25.01	1.19				
Highest	63.9	1.84	25.01	1.19	48.7	1.40	19.00	0.905
Average	42.8	1.23	16.70	.795	39.9	1.15	15.61	.743
Lowest	23.2	.667	9.06	.431	24.0	.690	9.36	.446

7. Cattail Creek at Roxbury Mills

Location.—Water-stage recorder, lat. 39°15′17″, long. 77°02′43″, on left bank 0.2 mile downstream from East Branch, a tributary from left bank, and county highway bridge, 0.5 mile southeast of Roxbury Mills, Howard County, and 1.3 miles upstream from mouth. Prior to Oct. 19, 1945, staff gage at same site and datum read twice daily.

Drainage area.—27.7 square miles.

Records available.—July 1944 to September 1952.

Average discharge.—8 water years (1945–52), 30.2 second-feet.

Extremes.—Maximum discharge, 1,060 second-feet May 25, 1952 (gage height, 9.29 feet), from rating curve extended above 300 second-feet on basis of slope-area determination of peak flow at gage height 8.97 feet and logarithmic plotting; minimum, 2.9 second-feet Aug. 26, Sept. 8, 1944 (gage height, 0.76 foot).

Remarks.—Records good except those for periods of ice effect or no gage-height record, which are fair. Diurnal fluctuation at low flow caused by mill at Roxbury Mills.

Monthly discharge of Cattail Creek at Roxbury Mills

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1944						
July 20–31	7.9	4.8	6.22	0.225	0.10	0.145
August	16	3.0	5.73	.207	.24	.134
September	56	3.2	7.88	.284	.32	.184
1944–45						
October	58	6.1	11.1	0.401	0.46	0.259
November	59	7.2	11.5	.415	.46	.268
December	117	9.7	22.0	.794	.92	.513
January	340	11	35.3	1.27	1.47	.821
February	145	10	45.4	1.64	1.71	1.06
March	99	18	30.0	1.08	1.25	.698
April	110	15	24.0	.866	.97	.560
May	36	12	18.2	.657	.76	.425
June	80	8.6	17.1	.617	.69	.399
July	212	6.9	45.5	1.64	1.89	1.06
August	286	13	32.1	1.16	1.33	.750
September	152	11	24.2	.874	.98	.565
The year	340	6.1	26.3	.949	12.89	.613

Monthly discharge of Cattail Creek at Roxbury Mills—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1945–46						
October	40	14	17.3	0.625	0.72	0.404
November	228	14	27.9	1.01	1.12	.653
December	232	24	47.1	1.70	1.96	1.10
January	65	25	36.9	1.33	1.53	.860
February	122	25	40.5	1.46	1.52	.944
March	61	30	34.9	1.26	1.45	.814
April	30	21	24.6	.888	.99	.574
May	87	18	27.7	1.00	1.15	.646
June	488	18	44.6	1.61	1.80	1.04
July	88	12	20.0	.722	.83	.467
August	74	11	17.8	.643	.74	.416
September	60	7.7	14.3	.516	.58	.333
The year	488	7.7	29.4	1.06	14.39	.685
1946–47						
October	27	10	13.8	0.498	0.57	0.322
November	19	12	13.1	.473	.53	.306
December	66	10	15.5	.560	.64	.362
January	75	16	24.9	.899	1.04	.581
February	22	13	17.2	.621	.65	.401
March	73	15	24.6	.888	1.02	.574
April	29	14	17.7	.639	.71	.413
May	119	14	24.3	.877	1.01	.567
June	77	11	21.6	.780	.87	.504
July	98	10	19.6	.708	.82	.458
August	107	7.4	17.5	.632	.73	.408
September	17	8.5	10.2	.368	.41	.238
The year	119	7.4	18.4	.664	9.00	.429
1947–48						
October	15	7.6	8.63	0.312	0.36	0.202
November	118	8.5	27.6	.996	1.11	.644
December	28	12	15.2	.549	.63	.355
January	232	16	33.5	1.21	1.39	.782
February	336	16	48.0	1.73	1.87	1.12
March	74	22	30.0	1.08	1.25	.698
April	73	22	29.9	1.08	1.20	.698
May	86	22	33.8	1.22	1.41	.789
June	103	20	34.9	1.26	1.40	.814
July	63	15	20.7	.747	.86	.483
August	57	15	24.5	.884	1.02	.571
September	49	13	16.7	.603	.67	.390
The year	336	7.6	26.8	.968	13.17	.626

Monthly discharge of Cattail Creek at Roxbury Mills—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948-49						
October	62	13	20.8	0.751	0.87	0.485
November	166	16	32.0	1.16	1.29	.750
December	367	25	59.3	2.14	2.47	1.38
January	249	36	70.3	2.54	2.93	1.64
February	130	48	64.8	2.34	2.44	1.51
March	182	34	51.5	1.86	2.14	1.20
April	77	26	37.8	1.36	1.52	.897
May	113	27	42.2	1.52	1.76	.982
June	31	20	23.5	.848	.95	.548
July	96	16	28.5	1.03	1.18	.666
August	93	14	22.0	.794	.92	.513
September	29	12	16.2	.585	.65	.378
The year	367	12	39.0	1.41	19.12	.911
1949-50						
October	83	13	19.5	0.704	0.81	0.455
November	38	16	18.8	.679	.76	.439
December	96	15	24.5	.884	1.02	.571
January	54	18	21.8	.787	.91	.509
February	117	25	44.2	1.60	1.66	1.03
March	243	22	45.2	1.63	1.88	1.05
April	42	24	29.2	1.05	1.18	.679
May	91	20	31.5	1.14	1.31	.737
June	74	16	26.6	.960	1.07	.620
July	24	11	16.0	.578	.67	.374
August	29	8.6	11.2	.404	.47	.261
September	167	9.5	30.2	1.09	1.22	.704
The year	243	8.6	26.4	.953	12.96	.616
1950-51						
October	68	15	19.8	0.715	0.82	0.462
November	353	14	29.9	1.08	1.20	.698
December	250	21	45.3	1.64	1.88	1.06
January	91	24	33.6	1.21	1.40	.782
February	242	33	60.7	2.19	2.28	1.42
March	88	31	40.2	1.45	1.67	.937
April	83	26	36.3	1.31	1.46	.847
May	96	21	30.6	1.10	1.28	.711
June	273	20	59.8	2.16	2.41	1.40
July	48	18	24.5	.884	1.02	.571
August	19	11	14.8	.534	.62	.345
September	15	8.4	10.7	.386	.43	.249
The year	353	8.4	33.6	1.21	16.47	.782

PATUXENT RIVER BASIN—*Continued*

Monthly discharge of Cattail Creek at Roxbury Mills—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	13	8.0	9.48	0.342	0.39	0.221
November	94	13	23.5	.848	.95	.548
December	100	13	29.5	1.06	1.23	.685
January	100	27	44.7	1.61	1.86	1.04
February	120	26	37.4	1.35	1.46	.873
March	104	28	39.7	1.43	1.65	.924
April	507	27	76.8	2.77	3.09	1.79
May	379	41	80.4	2.90	3.34	1.87
June	119	30	51.4	1.86	2.07	1.20
July	252	22	43.5	1.57	1.81	1.01
August	108	19	29.3	1.06	1.22	.685
September	367	19	36.0	1.30	1.45	.840
The year	507	8.0	41.8	1.51	20.52	.976

Yearly discharge of Cattail Creek at Roxbury Mills

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1945	26.3	0.949	12.89	0.613	30.3	1.09	14.85	0.704
1946	29.4	1.06	14.39	.685	25.2	.910	12.33	.588
1947	18.4	.664	9.00	.429	19.1	.690	9.36	.446
1948	26.8	.968	13.17	.626	32.0	1.16	15.70	.750
1949	39.0	1.41	19.12	.911	34.8	1.26	17.08	.814
1950	26.4	.953	12.96	.616	29.1	1.05	14.27	.679
1951	33.6	1.21	16.47	.782	30.9	1.12	15.14	.724
1952	41.8	1.51	20.52	.976				
Highest	41.8	1.51	20.52	.976	34.8	1.26	17.08	.814
Average	30.2	1.09	14.80	.704	28.8	1.04	14.12	.672
Lowest	18.4	.664	9.00	.429	19.1	.690	9.36	.446

Patuxent River Basin

8. Patuxent River near Ashton

Location.—Staff gage on right bank 1,000 feet downstream from highway bridge, 1 mile downstream from Hawlings River, 1½ miles northeast of Ashton, Montgomery County, and 7 miles upstream from gaging station near Burtonsville. An upper staff gage established on right bank upstream from bridge June 26, 1940 at Mink Hollow pumping plant.

Drainage area.—110 square miles.

Records available.—Aug. 16, 1939 to Sept. 30, 1945—low water gage heights only; read twice daily but not published.

Discharge measurements.—35 current-meter measurements made during period Aug. 15, 1939 to Sept. 25, 1942; results of measurements published in Bulletin 1 p. 278.

Remarks: This station was established on a temporary basis to determine the amount of water below the point of diversion by pumps and pipe line to Northwest Branch of Anacostia River Basin. Daily discharge computed only during periods of pumpage.

Cooperation.—Washington Suburban Sanitary Commission at Hyattsville.

9. Patuxent River near Burtonsville

Location.—Water-stage recorder and concrete control, lat. 39°07′47″, long. 76°55′04″, on right bank 150 feet upstream from highway bridge on old Columbia Road, 1½ miles northeast of Burtonsville, Montgomery County, and 8 miles downstream from Hawlings River. Datum of gage 232.79 feet above mean sea level, adjustment of 1912. From July 22, 1914 to July 10, 1929, waterstage recorder on left bank 80 feet downstream from highway bridge at present datum. Prior to July 22, 1914, staff gage at highway bridge, datum 1.29 feet higher than present datum.

Drainage area.—127 square miles.

Records available.—July 1911 to June 1912, July 1913 to February 1945. (Discontinued) Monthly records published to Sept. 30, 1943 in Maryland Bulletin No. 1, subsequent to Oct. 1, 1943 in Maryland Bulletin No. 10.

Average discharge.—31 years (1914–44), 125 second-feet (adjusted for storage and diversion).

Extremes.—Maximum discharge, 11,000 second-feet Aug. 24, 1933 (gage height, 21.7 feet, from floodmarks), from rating curve extended above 3,800 second-feet; minimum, 4.6 second-feet Oct. 9, 10, 1942 (gage height, 2.68 feet).

Remarks.—Published monthly records do not include diversion by pumps at Mink Hollow (drainage area 109 square miles), which began Aug. 12, 1939, of part of low-water flow into Anacostia River Basin to augment supply of Washington Suburban Sanitary Commission or change in contents in Triadelphia Reservoir (usable capacity, 2,913,000,000 gallons). Storage began June 27, 1942.

Cooperation.—Records of diversions and change in reservoir contents furnished by Washington Suburban Sanitary Commission at Hyattsville.

Yearly discharge of Patuxent River near Burtonsville

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1914	100	0.787	10.73	0.509	96.3	0.758	10.30	0.490
1915	141	1.11	15.05	.717	147	1.16	15.69	.750
1916	110	.866	11.85	.560	109	.858	11.71	.555
1917	128	1.01	13.70	.653	126	.992	13.45	.641
1918	124	.976	13.23	.631	124	.976	13.27	.631
1919	151	1.19	16.10	.769	168	1.32	17.94	.853
1920	184	1.45	19.66	.937	172	1.35	18.28	.873
1921	103	.811	11.00	.524	95.9	.755	10.25	.488
1922	99.1	.780	10.59	.504	95.7	.754	10.22	.487
1923	93.1	.733	9.93	.474	104	.819	11.15	.529
1924	201	1.58	21.57	1.02	208	1.64	22.24	1.06
1925	123	.969	13.16	.626	116	.913	12.45	.590
1926	119	.937	12.77	.606	141	1.11	15.11	.717
1927	153	1.20	16.31	.776	142	1.12	15.20	.724
1928	172	1.35	18.40	.873	160	1.26	17.10	.814
1929	116	.913	12.38	.590	117	.921	12.48	.595

PATUXENT RIVER BASIN—*Continued*

Yearly discharge of Patuxent River near Burtonsville—*Continued*

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1930	81.0	.638	8.65	.412	62.6	.493	6.68	.319
1931	51.7	.407	5.54	.263	52.1	.410	5.58	.265
1932	66.0	.520	7.08	.336	94.7	.746	10.15	.482
1933	187	1.47	19.95	.950	173	1.36	18.51	.879
1934	122	.961	13.03	.621	132	1.04	14.12	.672
1935	159	1.25	16.98	.808	154	1.21	16.48	.782
1936	166	1.31	17.79	.847	161	1.27	17.22	.821
1937	170	1.34	18.20	.866	205	1.61	21.96	1.04
1938	140	1.10	14.97	.711	103	.811	10.96	.524
1939	116	.913	12.38	.590	111	.874	11.91	.565
1940	101	.795	10.84	.514	112	.882	12.03	.570
1941	95.7	.754	10.22	.487	77.6	.611	8.28	.395
1942	69.8	.550	7.44	.355	102	.803	10.91	.519
1943	129	1.02	13.87	.659	114	.898	12.17	.580
1944	104	.819	11.13	.529	98.0	.772	10.51	.499
1945	—	—	—	—	—	—	—	—
Highest	201	1.58	21.57	1.02	208	1.64	22.24	1.06
Average	125	.984	13.36	.636	125	.984	13.36	.636
Lowest	51.7	.407	5.54	.263	52.1	.410	5.58	.265

Note: Figures in Yearly table from 1939 to 1945 have been adjusted for diversion of part of low-water flow into Anacostia River basin and adjusted for change in contents in Triadelphia Reservoir.

Patuxent River Basin

10. Patuxent River near Laurel

Location.—Water-stage recorder and concrete control. lat. 39°06′45″, long. 76°52′15″, on left bank, 1,700 feet downstream from Rocky Gorge pumping station, 0.4 mile upstream from Walker Branch, and 1.0 mile northwest of Laurel, Prince Georges County.

Drainage area.—133 square miles.

Records available.—October 1944 to September 1952. (Prior to Oct. 1, 1950 published in Bulletin 10).

Average discharge.—8 water years, 154 second-feet (adjusted for storage and diversion).

Extremes.—Maximum discharge 5,200 second-feet Sept. 1, 1952 (gage height, 10.47 feet), from rating curve extended above 2,500 second-feet by logarithmic plotting; minimum, 2.0 second-feet Feb. 20, 1947 (gage height, 1.25 feet); minimum daily, 18 second-feet Oct. 6, 9, Nov. 24, 1944.

Remarks.—Records excellent except those for periods of ice effect, which are fair. Records do not include diversion, by pumps, of part of low flow into Anacostia River Basin and at Willis School filtration plant for supply of Washington Suburban Sanitary Commission, and change in storage in Triadelphia Reservoir (usable capacity, 2,913,000,000 gallons between elevations 327.0 and 350.0 feet). Storage began June 27, 1942. Construction of Rocky Gorge Dam which began in March 1952 had little or no effect on discharge records in this report.

Cooperation.—Records of diversions and change in reservoir contents furnished by Washington Suburban Sanitary Commission at Hyattsville.

Monthly discharge of Patuxent River near Laurel

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950–51						
October	330	55	88.4			
November	1,610	66	169			
December	1,160	97	231			
January	286	84	142			
February	909	136	285			
March	599	122	181			
April	353	110	170			
May	512	72	133			
June	1,420	60	363			
July	401	58	101			
August	90	52	65.1			
September	98	40	53.6			
The year	1,610	40	164			

PATUXENT RIVER BASIN—*Continued*

Monthly discharge of Patuxent River near Laurel—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	68	31	42.5			
November	166	25	52.2			
December	300	31	69.8			
January	413	68	179			
February	648	110	172			
March	433	110	193			
April	2,400	122	444			
May	2,690	147	382			
June	557	88	204			
July	1,030	38	148			
August	725	35	107			
September	2,850	41	199			
The year	2,850	25	182			

Yearly discharge of Patuxent River near Laurel

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1945	146	1.10	14.93	0.711	167	1.26	17.10	0.814
1946	150	1.13	15.34	.730	126	.947	12.86	.612
1947	87.8	.660	.896	.427	94.0	.707	9.60	.457
1948	132	.992	13.50	.641	154	1.16	15.79	.750
1949	189	1.42	19.28	.918	167	1.26	17.10	.814
1950	135	1.02	13.85	.659	155	1.17	15.88	.756
1951	179	1.35	18.32	.873	160	1.20	16.29	.776
1952	213	1.60	21.78	1.03				
Highest	213	1.60	21.78	1.03	167	1.26	17.10	.814
Average	154	1.16	15.75	.750	146	1.10	14.93	.711
Lowest	87.8	.660	8.96	.427	94.0	.707	9.60	.457

Note: All figures in Yearly table have been adjusted for diversion from river at Mink Hollow and Willis School and change in storage contents in Triadelphia Reservoir.

11. Little Patuxent River at Guilford

Location.—Water-stage recorder and concrete control, lat. 39°10′04″, long. 76°51′07″, on left bank 75 feet upstream from highway bridge, 1 mile west of Guilford, Howard County, 3 miles upstream from Middle Patuxent River, and 4 miles north of Laurel. Prior to June 25, 1946, staff gage at same site and datum read twice daily.

Drainage area.—38.0 square miles.

Records available.—May 1932 to September 1952.

Average discharge.—20 water years, (1933–52), 41.4 second-feet.

Extremes.—Maximum discharge, 5,300 second-feet Sept. 1, 1952 (gage height, 13.26 feet), from rating curve extended above 1,800 second-feet on basis of contracted opening determination of peak flow; minimum, 3.6 second-feet Sept. 10 to Oct. 4, 1932; minimum gage height, 1.38 feet Sept. 29, 1941.

Remarks.—Records excellent except those for periods of ice effect, or doubtful, or no gage-height record, which are fair.

Monthly discharge of Little Patuxent River at Guilford

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1943–44						
October	150	6.6	17.8	0.468	0.54	0.302
November	763	15	50.0	1.32	1.47	.853
December	205	9.3	23.1	.608	.70	.393
January	577	15	56.2	1.48	1.71	.957
February	43	15	25.6	.674	.73	.436
March	310	25	66.2	1.74	2.01	1.12
April	123	32	48.8	1.28	1.43	.827
May	62	17	27.5	.724	.83	.468
June	177	12	23.9	.629	.70	.407
July	12	4.8	8.09	.213	.25	.138
August	82	4.4	11.3	.297	.34	.192
September	213	4.4	18.2	.479	.54	.310
The year	763	4.4	31.4	.826	11.25	.534
1944–45						
October	79	9.3	16.7	0.439	0.51	0.284
November	149	11	21.3	.561	.63	.363
December	319	16	35.4	.932	1.07	.602
January	613	19	74.6	1.96	2.26	1.27
February	229	18	64.1	1.69	1.76	1.09
March	123	26	42.6	1.12	1.29	.724
April	68	21	30.0	.789	.88	.510
May	48	14	23.2	.611	.70	.395
June	184	10	24.6	.647	.72	.418
July	1,240	11	119	3.13	3.61	2.02
August	166	19	34.4	.905	1.04	.585
September	348	20	41.6	1.09	1.22	.704
The year	1,240	9.3	43.9	1.16	15.69	.750

Monthly discharge of Little Patuxent River at Guilford—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1945–46						
October	43	19	22.7	0.597	0.69	0.386
November	271	20	43.8	1.15	1.29	.743
December	595	33	86.6	2.28	2.63	1.47
January	94	34	50.6	1.33	1.54	.860
February	212	25	65.1	1.71	1.79	1.11
March	115	38	50.8	1.34	1.54	.866
April	44	25	31.0	.816	.91	.527
May	160	21	43.1	1.13	1.31	.730
June	329	14	41.4	1.09	1.22	.704
July	392	13	33.2	.874	1.01	.565
August	143	12	20.9	.550	.63	.355
September	77	8.8	15.0	.395	.44	.255
The year	595	8.8	41.9	1.10	15.00	.711
1946–47						
October	32	10	14.8	0.389	0.45	0.251
November	27	13	14.9	.392	.44	.253
December	112	13	19.6	.516	.60	.333
January	94	18	34.1	.897	1.03	.580
February	27	11	19.7	.518	.54	.335
March	83	18	30.5	.803	.93	.519
April	37	16	21.0	.553	.62	.357
May	442	18	41.3	1.09	1.25	.704
June	405	14	41.3	1.09	1.21	.704
July	48	11	16.6	.437	.51	.282
August	56	8.4	12.6	.332	.38	.215
September	40	8.8	12.1	.318	.35	.206
The year	442	8.4	23.3	.613	8.31	.396
1947–48						
October	30	8.0	9.54	0.251	0.29	0.162
November	242	10	40.7	1.07	1.20	.692
December	54	13	17.8	.468	.54	.302
January	453	16	55.2	1.45	1.67	.937
February	497	15	69.1	1.82	1.96	1.18
March	127	31	46.3	1.22	1.40	.789
April	84	26	35.6	.937	1.05	.606
May	172	27	51.7	1.36	1.57	.879
June	349	23	58.0	1.53	1.70	.989
July	78	17	26.1	.687	.79	.444
August	75	15	26.2	.689	.79	.445
September	28	12	15.2	.400	.45	.259
The year	497	8.0	37.5	.987	13.41	.638

Monthly discharge of Little Patuxent River at Guilford—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948–49						
October	69	13	22.2	0.584	0.67	0.377
November	464	17	59.6	1.57	1.75	1.01
December	473	30	80.3	2.11	2.44	1.36
January	416	44	95.2	2.51	2.89	1.62
February	200	59	86.6	2.28	2.37	1.47
March	310	46	68.6	1.81	2.08	1.17
April	156	37	56.2	1.48	1.65	.957
May	296	30	61.2	1.61	1.86	1.04
June	48	20	25.9	.682	.76	.441
July	66	13	23.0	.605	.70	.391
August	66	11	17.8	.468	.54	.302
September	28	11	15.0	.395	.44	.255
The year	473	11	50.8	1.34	18.15	.866
1949–50						
October	78	12	18.1	0.476	0.55	0.308
November	34	13	17.3	.455	.51	.294
December	77	15	24.4	.642	.74	.415
January	78	17	23.3	.613	.71	.396
February	203	26	56.9	1.50	1.56	.969
March	380	20	53.5	1.41	1.62	.911
April	42	27	31.5	.829	.93	.536
May	96	28	40.4	1.06	1.23	.685
June	126	14	29.7	.782	.87	.505
July	184	13	36.9	.971	1.12	.628
August	237	10	22.0	.579	.67	.374
September	392	12	41.6	1.09	1.22	.704
The year	392	10	32.8	.863	11.73	.558
1950–51						
October	210	17	31.9	0.839	0.97	0.542
November	482	22	48.8	1.28	1.43	.827
December	445	27	69.9	1.84	2.12	1.19
January	144	34	47.0	1.24	1.43	.801
February	338	42	76.6	2.02	2.10	.131
March	229	38	58.5	1.54	1.78	.995
April	158	35	56.2	1.48	1.65	.957
May	177	29	43.9	1.16	1.33	.750
June	501	25	119	3.13	3.49	2.02
July	50	22	30.8	.811	.93	.524
August	21	11	15.8	.416	.48	.269
September	33	11	14.0	.368	.41	.238
The year	501	11	50.7	1.33	18.12	.860

Monthly discharge of Little Patuxent River at Guilford—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	28	10	13.4	0.353	0.41	0.228
November	124	16	29.6	.779	.87	.503
December	408	15	48.1	1.27	1.46	.821
January	159	36	59.1	1.56	1.79	1.01
February	284	35	51.3	1.35	1.46	.873
March	278	36	58.1	1.53	1.76	.989
April	1,110	37	135	3.55	3.96	2.29
May	1,100	40	101	2.66	3.06	1.72
June	100	30	48.1	1.27	1.41	.821
July	190	19	40.5	1.07	1.23	.692
August	343	19	38.3	1.01	1.16	.653
September	1,930	20	95.0	2.50	2.79	1.62
The year	1,930	10	59.6	1.57	21.36	1.01

Yearly discharge of Little Patuxent River at Guilford

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1933	56.3	1.48	20.09	0.957	52.7	1.39	18.83	0.898
1934	42.7	1.12	15.29	.724	45.7	1.20	16.36	.776
1935	53.7	1.41	19.17	.911	51.2	1.35	18.29	.873
1936	49.1	1.29	17.57	.834	47.4	1.25	16.96	.808
1937	49.8	1.31	17.80	.847	59.7	1.57	21.35	1.01
1938	39.2	1.03	14.02	.666	28.1	.739	10.03	.478
1939	31.5	.829	11.25	.536	32.0	.842	11.41	.544
1940	36.6	.963	13.11	.622	40.0	1.05	14.31	.679
1941	32.6	.858	11.65	.555	26.3	.692	9.40	.447
1942	24.6	.647	8.77	.418	33.1	.871	11.81	.563
1943	40.3	1.06	14.39	.685	36.9	.971	13.18	.628
1944	31.4	.826	11.25	.534	30.0	.789	10.75	.510
1945	43.9	1.16	15.69	.750	50.7	1.33	18.09	.860
1946	41.9	1.10	15.00	.711	33.2	.874	11.88	.565
1947	23.3	.613	8.31	.396	24.8	.653	8.85	.422
1948	37.5	.987	13.41	.638	45.4	1.19	16.24	.769
1949	50.8	1.34	18.15	.866	42.2	1.11	15.09	.717
1950	32.8	.863	11.73	.558	40.4	1.06	14.45	.685
1951	50.7	1.33	18.12	.860	45.7	1.20	16.34	.776
1952	59.6	1.57	21.36	1.01				
Highest	59.6	1.57	21.36	1.01	59.7	1.57	21.35	1.01
Average	41.4	1.09	14.80	.704	40.3	1.06	14.39	.685
Lowest	23.3	.613	8.31	.396	24.8	.653	8.85	.422

12. Little Patuxent River at Savage

Lcoation.—Water-stage recorder and concrete control, lat. 39°08′00″, long. 76°48′58″, on left bank 400 feet downstream from bridge on U. S. Highway 1, half a mile southeast of Savage, Howard County, and 1.1 mile downstream from Middle Patuxent River.

Drainage area.—98.4 square miles.

Records available.—November 1939 to September 1952.

Average discharge.—12 years (1940–52), 101 second-feet.

Extremes.—Maximum discharge, 6,280 second-feet Sept. 1, 1952 (gage height, 13.15 feet); minimum daily, 7.0 second-feet Sept. 19, 1943.

Maximum stage known, about 17.5 feet in August 1933, from information by local residents.

Remarks.—Records excellent except those for periods of ice effect or no gage-height record, which are fair. Prior to 1952 occasional regulation by power plant of Savage Manufacturing Co., 0.6 mile upstream from station. Slight diversion of about 0.1 second-foot for town of Savage water supply from mill raceway above mill. No upstream industrial use of water known but there has been evidence of occasional regulation from unknown sources above station.

Monthly discharge of Little Patuxent River at Savage

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1943–44						
October	344	14	45.5	0.462	0.53	0.299
November	1,670	34	118	1.20	1.34	.776
December	432	25	57.0	.579	.67	.374
January	1,710	40	152	1.54	1.79	.995
February	102	40	60.8	.618	.67	.399
March	600	57	157	1.60	1.84	1.03
April	398	76	123	1.25	1.40	.808
May	228	45	73.4	.746	.86	.482
June	402	32	59.2	.602	.67	.389
July	33	15	22.9	.233	.27	.151
August	186	11	27.1	.275	.32	.178
September	362	14	43.0	.437	.49	.282
The year	1,710	11	78.3	.796	10.85	.514
1944–45						
October	167	26	40.5	0.412	0.47	0.266
November	256	29	49.2	.500	.56	.323
December	793	42	93.2	.947	1.09	.612
January	1,280	52	171	1.74	2.01	1.12
February	537	50	164	1.67	1.74	1.08
March	240	64	105	1.07	1.23	.692
April	242	56	80.8	.821	.92	.531
May	150	39	67.1	.682	.79	.441
June	556	34	75.5	.767	.86	.496
July	2,660	27	312	3.17	3.65	2.05
August	487	53	99.5	1.01	1.17	.653
September	812	47	106	1.08	1.20	.698
The year	2,660	26	114	1.16	15.69	.750

Monthly discharge of Little Patuxent River at Savage—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1945–46						
October	96	50	59.5	0.605	0.70	0.391
November	662	47	105	1.07	1.19	.692
December	1,300	86	204	2.07	2.39	1.34
January	271	90	133	1.35	1.55	.873
February	487	94	166	1.69	1.76	1.09
March	258	101	133	1.35	1.55	.873
April	120	73	87.2	.886	.99	.573
May	340	66	113	1.15	1.33	.743
June	1,180	50	124	1.26	1.40	.814
July	570	33	69.2	.703	.81	.454
August	382	32	55.3	.562	.65	.363
September	191	22	41.5	.422	.47	.273
The year	1,300	22	107	1.09	14.79	.704
1946–47						
October	94	30	41.6	0.423	0.49	0.273
November	84	36	41.5	.422	.47	.273
December	238	35	54.7	.556	.64	.359
January	199	52	93.1	.946	1.09	.611
February	77	23	58.5	.595	.62	.385
March	192	52	85.3	.867	1.00	.560
April	108	46	60.0	.610	.68	.394
May	863	52	109	1.11	1.28	.717
June	634	31	87.6	.890	.99	.575
July	181	29	54.3	.552	.64	.357
August	316	24	43.3	.440	.51	.284
September	189	23	42.3	.430	.48	.278
The year	863	23	64.4	.654	8.89	.423
1947–48						
October	142	22	28.5	0.290	0.33	0.187
November	869	28	145	1.47	1.65	.950
December	173	43	57.5	.584	.67	.377
January	1,210	58	175	1.78	2.05	1.15
February	1,400	70	208	2.11	2.28	1.36
March	302	75	118	1.20	1.39	.776
April	211	64	91.9	.934	1.04	.604
May	443	60	128	1.30	1.50	.840
June	685	56	131	1.33	1.49	.860
July	218	40	62.6	.636	.73	.411
August	218	35	69.0	.701	.81	.453
September	86	28	37.8	.384	.43	.248
The year	1,400	22	104	1.06	14.37	.685

Monthly discharge of Little Patuxent River at Savage—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948–49						
October	207	32	55.5	0.564	0.65	0.365
November	1,130	39	141	1.43	1.60	.924
December	1,240	90	211	2.14	2.47	1.38
January	993	122	245	2.49	2.87	1.61
February	518	158	228	2.32	2.41	1.50
March	682	125	178	1.81	2.08	1.17
April	358	105	152	1.54	1.72	.995
May	683	84	160	1.63	1.87	1.05
June	130	46	69.9	.710	.79	.459
July	204	36	64.2	.652	.75	.421
August	201	30	54.5	.554	.64	.358
September	96	30	44.2	.449	.50	.290
The year	1,240	30	133	1.35	18.35	.873
1949–50						
October	223	32	51.2	0.520	0.60	0.336
November	92	39	50.7	.515	.58	.333
December	201	40	67.7	.688	.79	.445
January	167	46	59.9	.609	.70	.394
February	455	70	144	1.46	1.52	.944
March	908	54	135	1.37	1.59	.885
April	118	70	82.2	.835	.93	.540
May	337	70	109	1.11	1.28	.717
June	383	47	94.3	.958	1.07	.619
July	322	41	92.9	.944	1.09	.610
August	390	26	51.6	.524	.61	.339
September	1,240	30	127	1.29	1.44	.834
The year	1,240	26	88.4	.898	12.20	.580
1950–51						
October	437	47	82.9	0.842	0.97	0.544
November	1,310	63	135	1.37	1.54	.885
December	950	74	182	1.85	2.13	1.20
January	386	89	125	1.27	1.46	.821
February	902	120	217	2.21	2.30	1.43
March	507	105	152	1.54	1.78	.995
April	367	103	152	1.54	1.73	.995
May	438	76	113	1.15	1.32	.743
June	1,130	66	294	2.99	3.34	1.93
July	182	60	83.5	.849	.98	.549
August	60	34	46.5	.473	.54	.306
September	95	29	41.0	.417	.47	.270
The year	1,310	29	134	1.36	18.56	.879

PATUXENT RIVER BASIN—*Continued*

Monthly discharge of Little Patuxent River at Savage—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	71	26	37.6	0.382	0.44	0.247
November	312	47	83.6	.850	.95	.549
December	700	47	123	1.25	1.44	.808
January	377	96	150	1.52	1.76	.982
February	540	93	135	1.37	1.48	.885
March	534	103	164	1.67	1.92	1.08
April	2,880	99	351	3.57	3.98	2.31
May	2,270	128	279	2.84	3.26	1.84
June	296	91	141	1.43	1.59	.924
July	436	63	120	1.22	1.41	.789
August	865	56	109	1.11	1.28	.717
September	2,880	57	179	1.82	2.03	1.18
The year	2,880	26	156	1.59	21.54	1.03

Yearly discharge of Little Patuxent River at Savage

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1940					93.4	0.949	12.93	0.613
1941	77.3	0.786	10.67	0.508	62.4	.634	8.61	.410
1942	59.3	.603	8.17	.390	81.2	.825	11.20	.533
1943	98.8	1.00	13.63	.646	89.2	.907	12.30	.586
1944	78.3	.796	10.85	.514	75.3	.765	10.43	.494
1945	114	1.16	15.69	.750	129	1.31	17.85	.847
1946	107	1.09	14.79	.704	87.8	.892	12.11	.577
1947	64.4	.654	8.89	.423	72.0	.732	9.94	.473
1948	104	1.06	14.37	.685	119	1.21	16.44	.782
1949	133	1.35	18.35	.873	113	1.15	15.60	.743
1950	88.4	.898	12.20	.580	108	1.10	14.87	.711
1951	134	1.36	18.56	.879	121	1.23	16.75	.795
1952	156	1.59	21.54	1.03				
Highest	156	1.59	21.54	1.03	129	1.31	17.85	.847
Average	101	1.03	13.98	.666	95.9	.975	13.24	.630
Lowest	59.3	.603	8.17	.390	62.4	.634	8.61	.410

Patuxent River Basin

13. Dorsey Run near Jessup

(formerly published as Dorsey Run at Annapolis Junction)

Location.—Water-stage recorder and concrete control, lat. 39°07′15″, long. 76°47′00″, on left bank at downstream side of bridge on State Highway 647, 0.6 mile southeast of Fort George G. Meade Junction (formerly Annapolis Junction), 1.0 mile upstream from mouth, and 2 miles south of Jessup, Anne Arundel County.

Drainage area.—11.6 square miles.

Records available.—July 1948 to September 1952. (Prior to October 1951, published as "at Annapolis Junction.")

Average discharge.—4 water years (1949–52), 15.5 second-feet.

Extremes.—Maximum discharge, 1,250 second-feet Sept. 1, 1952 (gage height, 11.99 feet, from high-water mark in gage house), from rating curve extended above 390 second-feet on basis of contracted-opening determination of peak flow; minimum, 1.9 second-feet Aug. 17, 1950 (gage height, 1.38 feet).

Remarks.—Records excellent except those for periods of ice effect, which are good, and those for periods of fragmentary or no gage-height record, or those above 400 second-feet, which are fair.

Monthly discharge of Dorsey Run near Jessup

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948						
July 1–31	13	4.9	8.12	0.700	0.81	0.452
August	84	4.9	17.0	1.47	1.69	.950
September	11	3.6	4.80	.414	.46	.268
1948–49						
October	25	4.1	8.51	0.734	0.85	0.474
November	202	6.1	22.2	1.91	2.14	1.23
December	170	10	33.4	2.88	3.32	1.86
January	136	12	34.1	2.94	3.39	1.90
February	86	17	29.8	2.57	2.68	1.66
March	108	12	21.7	1.87	2.16	1.21
April	46	8.9	16.3	1.41	1.57	.911
May	153	7.1	21.9	1.89	2.18	1.22
June	20	4.2	6.82	.588	.66	.380
July	14	2.8	5.18	.447	.52	.289
August	28	2.6	5.14	.443	.51	.286
September	11	2.8	4.11	.354	.40	.229
The year	202	2.6	17.4	1.50	20.38	.969

PATUXENT RIVER BASIN—*Continued*

Monthly discharge of Dorsey Run near Jessup—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1949–50						
October	25	3.6	5.86	0.505	0.58	0.326
November	13	4.2	5.60	.483	.54	.312
December	17	4.5	7.96	.686	.79	.443
January	28	4.8	7.35	.634	.73	.410
February	67	7.5	21.3	1.84	1.91	1.19
March	138	5.8	17.6	1.52	1.75	.982
April	12	6.6	8.48	.731	.82	.472
May	35	6.2	11.9	1.03	1.19	.666
June	41	3.0	8.93	.770	.86	.498
July	60	2.8	9.23	.796	.92	.514
August	138	2.4	8.00	.690	.80	.446
September	77	2.8	12.0	1.03	1.16	.666
The year	138	2.4	10.3	.888	12.05	.574
1950–51						
October	68	4.5	9.19	0.792	0.91	0.512
November	109	5.1	10.9	.940	1.05	.608
December	112	7.5	21.0	1.81	2.09	1.17
January	41	8.4	13.0	1.12	1.29	.724
February	135	12	28.9	2.49	2.59	1.61
March	100	9.4	19.5	1.68	1.94	1.09
April	67	9.4	20.1	1.73	1.94	1.12
May	38	6.2	11.6	1.00	1.15	.646
June	251	5.1	41.8	3.60	4.02	2.33
July	81	4.5	10.2	.879	1.02	.568
August	8.4	3.6	5.07	.437	.50	.282
September	31	3.4	5.86	.505	.56	.326
The year	251	3.4	16.3	1.41	19.06	.911
1951–52						
October	9.1	3.4	4.76	0.410	0.47	0.265
November	86	5.4	13.6	1.17	1.30	.756
December	218	6.2	21.7	1.87	2.16	1.21
January	69	11	24.9	2.15	2.47	1.39
February	138	9.4	19.1	1.65	1.78	1.07
March	92	11	21.6	1.86	2.15	1.20
April	443	9.4	46.2	3.98	4.44	2.57
May	68	10	19.1	1.65	1.90	1.07
June	21	4.8	9.11	.785	.88	.507
July	50	3.9	8.21	.708	.82	.458
August	29	3.6	6.79	.585	.67	.378
September	442	4.8	21.8	1.88	2.10	1.22
The year	443	3.4	18.0	1.55	21.14	1.00

PATUXENT RIVER BASIN—*Continued*

Yearly discharge of Dorsey Run near Jessup

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1949	17.4	1.50	20.38	0.969	13.6	1.17	15.98	0.756
1950	10.3	.888	12.05	.574	12.1	1.04	14.19	.672
1951	16.3	1.41	19.06	.911	16.2	1.40	18.94	.905
1952	18.0	1.55	21.14	1.00				
Highest	18.0	1.55	21.14	1.00	16.2	1.40	18.94	.905
Average	15.5	1.34	18.19	.866	14.0	1.21	16.42	.782
Lowest	10.3	.888	12.05	.574	12.1	1.04	14.19	.672

14. Bennett Creek at Park Mills

Location.—Water-stage recorder and concrete control, lat. 39°17′40″, long. 77°24′30″, on left bank 75 feet downstream from county highway bridge, 0.2 mile south of Park Mills, Frederick County, 1.8 miles upstream from mouth, and 3.7 miles southwest of Urbana.

Drainage area.—62.8 square miles.

Records available.—July 1948 to September 1952.

Average discharge.—4 water years (1949–52), 74.4 second-feet.

Extremes.—Maximum discharge, 2,400 second-feet Dec. 4, 1950 (gage height, 8.12 feet) from rating curve extended above 1,500 second-feet on basis of slope-area determination of peak flow; minimum, 8.0 second-feet Oct. 7, 1951; minimum daily, 9.0 second-feet Oct. 6, 1951.

Remarks.—Records excellent except those for periods of ice effect or no gage-height record, which are fair.

Monthly discharge of Bennett Creek at Park Mills

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948						
July 29–31	—	—	—	—	—	—
August	179	22	50.6	0.806	0.93	0.521
September	58	16	21.9	.349	.39	.226
1948–49						
October	200	16	42.3	0.674	0.78	0.436
November	521	27	75.9	1.21	1.35	.782
December	1,070	61	180	2.87	3.31	1.85
January	700	96	211	3.36	3.88	2.17
February	300	120	169	2.69	2.81	1.74
March	321	68	102	1.62	1.87	1.05
April	199	58	84.7	1.35	1.50	.873
May	245	44	75.5	1.20	1.39	.776
June	48	25	34.2	.545	.61	.352
July	330	19	62.5	.995	1.15	.643
August	154	19	30.1	.479	.55	.310
September	53	15	23.0	.366	.41	.237
The year	1,070	15	90.7	1.44	19.61	.931
1949–50						
October	107	16	25.2	0.401	0.46	0.259
November	59	20	25.2	.401	.45	.259
December	233	20	54.6	.869	1.00	.562
January	145	27	39.7	.632	.73	.408
February	408	50	129	2.05	2.14	1.32
March	900	40	120	1.91	2.21	1.23
April	84	44	56.7	.903	1.01	.584
May	150	44	65.4	1.04	1.20	.672
June	100	19	38.1	.607	.68	.392
July	107	15	25.7	.409	.47	.264
August	36	10	14.1	.225	.26	.145
September	64	11	22.4	.357	.40	.231
The year	900	10	50.9	.811	11.01	.524

Monthly discharge of Bennett Creek at Park Mills - *Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950-51						
October	134	13	24.5	0.390	0.45	0.252
November	592	19	49.6	.790	.88	.511
December	830	38	101	1.61	1.85	1.04
January	100	40	54.1	.861	.99	.556
February	671	60	153	2.44	2.54	1.58
March	215	65	88.3	1.41	1.62	.911
April	139	48	70.8	1.13	1.26	.730
May	149	35	55.9	.890	1.03	.575
June	672	30	140	2.23	2.49	1.44
July	152	27	47.6	.758	.87	.490
August	31	14	21.0	.334	.39	.216
September	20	9.5	12.9	.205	.23	.132
The year	830	9.5	67.5	1.07	14.60	.692
1951-52						
October	24	9.0	13.6	0.217	0.25	0.140
November	105	17	28.5	.454	.51	.293
December	216	15	49.1	.782	.90	.505
January	277	53	107	1.70	1.96	1.10
February	383	50	90.2	1.44	1.55	.931
March	297	52	102	1.62	1.87	1.05
April	1,570	70	263	4.19	4.67	2.71
May	560	78	166	2.64	3.05	1.71
June	213	39	69.2	1.10	1.23	.711
July	248	24	47.9	.763	.88	.493
August	648	25	61.3	.976	1.13	.631
September	886	28	67.1	1.07	1.19	.692
The year	1,570	9.0	88.5	1.41	19.19	.911

Yearly discharge of Bennett Creek at Park Mills

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1949	90.7	1.44	19.61	0.931	74.4	1.18	16.08	0.763
1950	50.9	.811	11.01	.524	56.8	.904	12.28	.584
1951	67.5	1.07	14.60	.692	60.5	.963	13.08	.622
1952	88.5	1.41	19.19	.911				
Highest	90.7	1.44	19.61	.931	74.4	1.18	16.08	.763
Average	74.4	1.18	16.02	.763	63.9	1.02	13.85	.659
Lowest	50.9	.811	11.01	.524	56.8	.904	12.28	.584

15. Great Seneca Creek near Gaithersburg

Location.—Chain gage, lat 39°10′01″, long. 77°13′37″, on left downstream side of highway bridge 0.1 mile downstream from Whetstone Run and 2 miles northwest of Gaithersburg, Montgomery County. Datum of gage is 305.37 feet above mean sea level (Washington Suburban Sanitary Commission bench mark).

Drainage area.—41.0 square miles.

Records available.—March 1925 to January 1931 (discontinued).

Average discharge.—5 water years (1926–30), 36.5 second-feet.

Extremes.—Maximum discharge, about 800 second-feet Nov. 16, 1926 (gage height, 8.80 feet), from rating curve extended above 450 second-feet; minimum, 1.3 second-feet Sept. 28, 1930 (gage height, 0.94 foot); minimum daily, 1.3 second-feet Sept. 28, 1930.

Remarks.—Chain gage read twice daily by observer. Control not permanent. Winter discharges subject to ice effect.

Yearly discharge of Great Seneca Creek near Gaithersburg

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1926	31.6	0.771	10.48	0.498	36.6	0.893	12.12	0.577
1927	43.7	1.07	14.44	.692	41.0	1.00	13.57	.646
1928	48.0	1.17	15.93	.756	45.2	1.10	15.01	.711
1929	36.0	.878	11.93	.567	36.2	.883	12.00	.571
1930	23.1	.563	7.66	.364	17.4	.424	5.75	.274
Highest	48.0	1.17	15.93	.756	45.2	1.10	15.01	.711
Average	36.5	.890	12.08	.575	35.3	.860	11.67	.556
Lowest	23.1	.563	7.66	.364	17.4	.424	5.75	.274

16. Seneca Creek at Dawsonville

Location.—Water-stage recorder and concrete control, lat. 39°07′41″, long. 77°20′13″, on right bank 60 feet downstream from highway bridge, 150 feet downstream from confluence of Great Seneca and Little Seneca Creeks, and half a mile east of Dawsonville, Montgomery County. Datum of gage is 214.15 feet above mean sea level, adjustment of 1912.

From Nov. 10, 1930 to Apr. 12, 1934, water-stage recorder in pipe well at downstream end of bridge pier at same datum. From Sept. 26 to Nov. 10, 1930 chain gage at same datum read to hundredths twice daily by observer.

Drainage area.—101 square miles.

Records available.—September 1930 to September 1952. (Sept. 26–30, 1930 unpublished).

Average discharge.—22 years, 96.5 second-feet.

Extremes.—Maximum discharge, 6,500 second-feet Aug. 24, 1933 (gage height, 10.3 feet), from rating curve extended above 2,000 second-feet on basis of velocity-area studies; minimum, 1.7 second-feet Sept. 28, 29, 1930 (gage height, 0.56 foot); minimum daily, 1.8 second-feet Sept. 29, 1930.

Remarks.—Records excellent except those for periods of ice effect, fragmentary, missing or doubtful gage-height record, which are fair.

Monthly discharge of Seneca Creek at Dawsonville

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1943–44						
October	203	15	34.6	0.343	0.40	0.222
November	1,360	32	112	1.11	1.23	.717
December	429	27	61.2	.606	.70	.392
January	1,410	38	138	1.37	1.58	.885
February	109	35	56.2	.556	.60	.359
March	557	62	169	1.67	1.93	1.08
April	508	89	149	1.48	1.65	.957
May	155	50	79.8	.790	.91	.511
June	131	27	44.1	.437	.49	.282
July	40	12	20.8	.206	.24	.133
August	69	9.1	15.7	.155	.18	.100
September	105	9.8	23.7	.235	.26	.152
The year	1,410	9.1	75.4	.747	10.17	.483
1944–45						
October	188	22	46.7	0.462	0.53	0.299
November	144	27	39.5	.391	.44	.253
December	531	40	88.8	.879	1.01	.568
January	680	42	109	1.08	1.25	.698
February	417	38	159	1.57	1.64	1.01
March	278	64	108	1.07	1.24	.692
April	269	55	80.5	.797	.89	.515
May	157	41	67.0	.663	.76	.429
June	825	34	96.6	.956	1.07	.618
July	845	35	203	2.01	2.32	1.30
August	1,220	52	139	1.38	1.59	.892
September	651	44	99.2	.982	1.10	.635
The year	1,220	22	103	1.02	13.84	.659

Monthly discharge of Seneca Creek at Dawsonville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1945–46						
October	106	52	63.3	0.627	0.72	0.405
November	800	48	113	1.12	1.25	.724
December	1,060	77	190	1.88	2.17	1.22
January	286	90	132	1.31	1.51	.847
February	474	90	148	1.47	1.53	.950
March	193	99	123	1.22	1.41	.789
April	106	71	81.3	.805	.90	.520
May	965	66	173	1.71	1.98	1.11
June	1,880	71	193	1.91	2.14	1.23
July	350	45	73.9	.732	.84	.473
August	183	40	62.7	.621	.72	.401
September	410	27	57.7	.571	.64	.369
The year	1,880	27	117	1.16	15.81	.750
1946–47						
October	122	31	47.2	0.467	0.54	0.302
November	77	40	46.0	.455	.51	.294
December	168	34	50.7	.502	.58	.324
January	334	54	94.9	.940	1.08	.608
February	77	38	55.4	.549	.57	.355
March	285	50	94.6	.937	1.08	.606
April	136	45	57.2	.566	.63	.366
May	473	52	96.5	.955	1.10	.617
June	341	31	59.3	.587	.65	.379
July	234	29	61.7	.611	.70	.395
August	242	22	48.0	.475	.55	.307
September	72	21	27.6	.273	.30	.176
The year	473	21	61.8	.612	8.29	.396
1947–48						
October	41	16	19.3	0.191	0.22	0.123
November	311	22	64.2	.636	.71	.411
December	83	30	41.8	.414	.48	.268
January	512	42	104	1.03	1.19	.666
February	950	44	160	1.58	1.71	1.02
March	301	74	113	1.12	1.29	.724
April	255	71	102	1.01	1.13	.653
May	383	71	118	1.17	1.35	.756
June	722	48	105	1.04	1.16	.672
July	439	31	66.8	.661	.76	.427
August	126	31	52.9	.524	.60	.339
September	83	26	34.2	.339	.38	.219
The year	950	16	81.5	.807	10.98	.522

Monthly discharge of Seneca Creek at Dawsonville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948–49						
October	259	25	62.1	0.615	0.71	0.397
November	930	44	117	1.16	1.29	.750
December	1,340	96	245	2.43	2.80	1.57
January	920	131	262	2.59	2.99	1.67
February	451	183	248	2.46	2.56	1.59
March	646	137	188	1.86	2.15	1.20
April	319	105	153	1.51	1.69	.976
May	462	103	168	1.66	1.92	1.07
June	113	54	72.1	.714	.80	.461
July	729	50	140	1.39	1.59	.898
August	270	47	71.3	.706	.81	.456
September	103	34	47.0	.465	.52	.301
The year	1,340	25	147	1.46	19.83	.944
1949–50						
October	251	38	56.9	0.563	0.65	0.364
November	131	44	55.8	.552	.62	.357
December	340	44	88.0	.871	1.00	.563
January	209	61	76.3	.755	.87	.488
February	585	85	181	1.79	1.87	1.16
March	1,310	72	180	1.78	2.05	1.15
April	126	80	96.3	.953	1.06	.616
May	237	78	117	1.16	1.33	.750
June	255	53	96.3	.953	1.06	.616
July	543	51	106	1.05	1.22	.679
August	119	31	44.2	.438	.50	.283
September	412	36	87.8	.869	.97	.562
The year	1,310	31	98.3	.973	13.20	.629
1950–51						
October	262	48	69.0	0.683	0.79	0.441
November	1,030	49	101	1.00	1.11	.646
December	1,420	73	176	1.74	2.01	1.12
January	206	75	100	.990	1.15	.640
February	1,030	131	227	2.25	2.35	1.45
March	303	100	134	1.33	1.53	.860
April	261	90	128	1.27	1.41	.821
May	349	65	103	1.02	1.18	.659
June	1,410	61	281	2.78	3.10	1.80
July	360	64	108	1.07	1.23	.692
August	79	33	48.6	.481	.55	.311
September	71	28	34.9	.346	.39	.224
The year	1,420	28	125	1.24	16.80	.801

Monthly discharge of Seneca Creek at Dawsonville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	44	24	28.4	0.281	0.32	0.182
November	243	35	61.0	.604	.67	.390
December	311	36	89.4	.885	1.02	.572
January	358	82	148	1.47	1.69	.950
February	466	84	129	1.28	1.38	.827
March	300	89	131	1.30	1.49	.840
April	1,690	99	287	2.84	3.17	1.84
May	900	150	243	2.41	2.77	1.56
June	602	84	138	1.37	1.52	.885
July	575	52	101	1.00	1.15	.646
August	819	54	138	1.37	1.57	.885
September	2,080	61	155	1.53	1.71	.989
The year	2,080	24	137	1.36	18.46	.879

Yearly discharge of Seneca Creek at Dawsonville

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1931	32.8	0.325	4.40	0.210	31.9	0.316	4.29	0.204
1932	46.0	.455	6.20	.294	71.4	.707	9.61	.457
1933	140	1.39	18.73	.898	125	1.24	16.74	.801
1934	87.3	.864	11.74	.558	94.6	.937	12.72	.606
1935	114	1.13	15.33	.730	112	1.11	15.06	.717
1936	121	1.20	16.27	.776	118	1.17	15.88	.756
1937	125	1.24	16.77	.801	150	1.49	20.07	.963
1938	103	1.02	13.86	.659	76.8	.760	10.32	.491
1939	97.1	.961	13.03	.621	93.8	.929	12.60	.600
1940	75.4	.747	10.17	.483	82.2	.814	11.07	.526
1941	67.9	.672	9.12	.434	55.2	.547	7.42	.354
1942	57.2	.566	7.68	.366	91.9	.910	12.35	.588
1943	110	1.09	14.82	.704	87.2	.863	11.72	.558
1944	75.4	.747	10.17	.483	72.9	.722	9.82	.467
1945	103	1.02	13.84	.659	119	1.18	16.00	.763
1946	117	1.16	15.81	.750	98.8	.978	13.30	.632
1947	61.8	.612	8.29	.396	60.2	.596	8.07	.385
1948	81.5	.807	10.98	.522	107	1.06	14.37	.685
1949	147	1.46	19.83	.944	129	1.28	17.30	.827
1950	98.3	.973	13.20	.629	111	1.10	14.84	.711
1951	125	1.24	16.80	.801	111	1.10	14.90	.711
1952	137	1.36	18.46	.879				
Highest	147	1.46	19.83	.944	150	1.49	20.07	.963
Average	96.5	.955	12.96	.617	95.2	.943	12.80	.609
Lowest	32.8	.325	4.40	.210	31.9	.316	4.29	.204

17. Potomac River at Great Falls

Location.—At masonry dam at Great Falls, Montgomery County, about 8 miles upstream from existing gaging station (at Leiter's Estate) near Washington, D. C., and about 10 miles upstream from Chain Bridge at Washington, D. C.

Purpose.—Early discharge records for this site were determined to show the probable extent of availability of the yield of the Potomac River basin, for the development of hydro-electric power near Great Falls, according to Senate Document No. 403, 66th Congress, Third Session.

Drainage area.—11,460 square miles (used in Corps of Engineers Report of Feb. 15, 1921 for the 66th Congress, Third Session).

Records available.—January 1886 to December 1891: Monthly tables containing maximum, minimum and mean daily discharges, depth in inches, and second-feet per square mile published in 14th Annual Report, Part 2, p. 135–136 of U. S. Geological Survey.

October 1896–June 1920: Mean daily discharge and monthly tables similar to those above published in Bulletin No. 31 by the Virginia Geological Survey.

Methods used on 1886–1891 records.—A long series of observations has been obtained by the Corps of Engineers of the river stage at the dam of the Washington aqueduct (at Great Falls, Md.). Similar gage observations were obtained 3-times daily at Chain Bridge (at Washington, D. C.) from May 4, 1891 to May 4, 1893. Measurements of flow by means of a Haskell electric current meter were made periodically at or near Chain Bridge and by means of which records of mean daily discharge at Great Falls were computed for the calendar years 1886–1891 by use of a stage-relationship curve based on observations at Chain Bridge and the Aqueduct dam.

Methods used on 1896–1920 records.—A composite method was used by combining daily streamflow records for gaging stations on Potomac River at Point of Rocks, Md. (9,656 square miles) and Monocacy River at Frederick, Md. (665 square miles) plus a verified allowance of 9% for the remaining ungaged area. With 90% of the total drainage area gaged this method was believed to give a reasonable derivation of flow for Great Falls which was sufficient for the purpose of hydro-electric studies.

Extremes.—1886–1891: Maximum daily discharge estimated about 472,000 second-feet June 2, 1889 (stage, 165.09 feet above mean sea level).

1892–1893: (see records for Chain Bridge)

1896–1920: Maximum daily discharge, 248,000 second-feet.

Mar. 2, 1902; minimum, 653 second-feet Sept. 10, 1914; minimum 7-day average, 1,030 second-feet Sept. 9–15, 1914.

Average discharge.— 6 calendar years (1886–1891), 20,160 second-feet.
(Chain Bridge)— 2 calendar years (1892–1893), 14,640 second-feet.
23 water years (1897–1919), 11,930 second-feet; median discharge for 50% of time, 6,240 second-feet.

History.—The initial Washington Aqueduct dam at Great Falls was across the Maryland channel only and was of rubble construction. This was replaced in September 1867 with a masonry dam. The first complete dam to the Virginia shore was completed August 1886 at elevation 149.09 feet above mean sea level and was raised in November 1896 to 151.59 feet above mean sea level. This original stream-gaging work on the Potomac River represents one of the earliest attempts by the U. S. Geological Survey in this part of the Country to systematically collect streamflow records and measure discharge by meter.

Remarks. No adjustments were made in the 1896–1920 computations for diversion of Aqueduct dam for water supply or for the flow in the Chesapeake and Ohio Canal. Capacities of 135 and 170 second-feet, respectively, were estimated in 1920 for the aqueduct and the canal, and 75 to 100 second-feet was estimated for the canal at Point of Rocks. During 1886–1891 there was no published mention of diversion so undoubtedly adjustments were not made.

Monthly discharge of Potomac River at Great Falls

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1886						
January	154,560	2,620	13,711	1.20	1.38	0.776
February	161,600	2,460	22,523	1.97	2.05	1.27
March	65,400	2,800	5,537	.48	.55	.310
April	224,600	2,800	44,313	3.87	4.32	2.50
May	167,840	2,620	24,206	2.11	2.43	1.36
June	3,240	2,800	2,993	.26	.29	.168
July	24,800	2,800	5,280	.46	.53	.297
August	20,400	3,240	6,010	.52	.60	.336
September	3,580	3,240	3,387	.30	.33	.194
1886-87						
October	4,290	3,240	3,318	0.29	0.33	0.187
November	39,500	3,240	7,948	.69	.77	.446
December	29,700	3,240	10,903	.95	1.10	.614
January	104,320	4,290	12,208	1.07	1.23	.692
February	54,200	5,460	24,256	2.12	2.21	1.37
March	84,000	5,460	27,311	2.38	2.74	1.54
April	71,000	4,290	14,113	1.23	1.37	.795
May	104,320	5,460	25,181	2.20	2.54	1.42
June	29,700	4,290	14,159	1.24	1.38	.801
July	29,700	3,240	6,118	.53	.61	.343
August	5,460	3,000	3,541	.31	.36	.200
September	4,290	3,240	3,581	.31	.35	.200
The year	104,320	3,000				
1887-88						
October	3,580	3,240	3,349	0.29	0.33	0.187
November	3,240	3,240	3,240	.28	.31	.181
December	10,500	3,240	5,613	.49	.56	.317
January	44,400	3,240	12,754	1.11	1.28	.717
February	65,400	4,290	27,768	2.42	2.61	1.56
March	59,800	7,900	28,897	2.52	2.90	1.63
April	44,400	4,290	17,990	1.57	1.75	1.01
May	29,700	3,580	10,634	.93	1.07	.601
June	34,600	3,000	8,707	.76	.85	.491
July	213,000	3,240	18,640	1.63	1.88	1.05
August	24,800	3,000	4,942	.43	.50	.278
September	84,000	3,240	16,833	1.47	1.64	.950
The year	213,000	3,000				

Monthly discharge of Potomac River at Great Falls—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1888–89						
October	39,500	3,580	7,077	0.62	0.72	0.401
November	54,200	5,460	16,435	1.43	1.60	.924
December	84,000	3,580	13,703	1.20	1.38	.776
January	120,080	5,460	31,292	2.73	3.15	1.76
February	65,400	5,460	19,049	1.66	1.73	1.07
March	188,200	10,500	37,932	3.31	3.82	2.14
April	167,840	7,900	35,791	3.12	3.48	2.02
May	44,400	7,900	19,020	1.66	1.91	1.07
June	471,700	3,580	47,761	4.17	4.65	2.70
July	65,400	3,240	9,610	.84	.97	.543
August	65,400	5,460	16,393	1.43	1.65	.924
September	71,000	5,460	25,497	2.22	2.48	1.43
The year	471,700	3,240				
1889–90						
October	137,680	7,900	29,573	2.58	2.97	1.67
November	167,840	20,400	65,214	5.69	6.35	3.68
December	104,320	16,300	27,820	2.43	2.80	1.57
January	16,300	5,460	9,652	.84	.97	.543
February	84,000	3,580	38,948	3.40	3.54	2.20
March	180,000	16,300	48,920	4.27	4.92	2.76
April	59,800	10,500	25,330	2.21	2.47	1.43
May	204,700	16,300	50,422	4.40	5.07	2.84
June	34,600	13,100	20,553	1.79	2.00	1.16
July	24,800	3,000	6,426	.56	.65	.362
August	24,800	3,000	6,788	.59	.68	.381
September	24,800	3,580	7,913	.69	.77	.446
The year	204,700	3,000				
1890–91						
October	154,560	5,460	23,616	2.06	2.38	1.33
November	16,300	5,460	9,394	.82	.92	.530
December	20,400	4,290	8,457	.74	.85	.478
January	120,080	7,900	40,710	3.55	4.09	2.29
February	173,920	34,600	79,986	6.98	7.27	4.51
March	154,560	20,400	59,653	5.21	6.01	3.37
April	229,600	10,500	71,444	6.23	6.95	4.03
May	29,700	4,290	6,260	.55	.63	.355
June	104,320	5,460	22,062	1.93	2.15	1.25
July	24,800	5,460	11,717	1.02	1.18	.659
August	24,800	3,240	7,102	.62	.71	.401
September	16,300	3,000	6,022	.53	.59	.343
The year	229,600	3,000				

POTOMAC RIVER BASIN—*Continued*

Monthly discharge of Potomac River at Great Falls—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1891						
October	3,580	3,000	3,948	0.34	0.39	0.220
November	5,460	3,240	4,546	.40	.45	.259
December	54,200	3,580	9,682	.84	.97	.543
1896–97						
October	174,000	2,320	13,800	1.20	1.38	0.776
November	35,100	2,340	7,880	.688	.77	.445
December	13,400	2,340	5,350	.467	.54	.302
January	9,310	2,700	4,970	.434	.50	.281
February	202,000	7,540	49,100	4.28	4.46	2.77
March	36,700	13,200	24,200	2.11	2.43	1.36
April	32,000	6,730	12,800	1.12	1.25	.724
May	10,400	6,730	26,800	2.34	2.70	1.51
June	10,200	4,660	7,080	.618	.69	.399
July	13,700	3,520	6,540	.571	.66	.369
August	16,000	3,780	5,550	.484	.56	.313
September	4,190	2,300	2,760	.241	.27	.156
The year	202,000	2,300	13,700	1.20	16.21	.776
1897–98						
October	3,010	2,020	2,290	0.200	0.23	0.129
November	12,900	1,910	3,350	.292	.33	.189
December	29,000	3,430	9,320	.813	.94	.525
January	49,400	4,060	18,300	1.60	1.84	1.03
February	25,000	7,330	10,700	.934	.97	.604
March	74,400	5,510	18,100	1.58	1.82	1.02
April	58,300	10,400	18,200	1.59	1.77	1.03
May	84,800	7,120	21,400	1.87	2.16	1.21
June	9,580	3,120	5,040	.440	.49	.284
July	5,100	1,870	2,840	.248	.29	.160
August	122,000	4,200	25,100	2.19	2.52	1.42
September	4,160	2,300	2,860	.250	.28	.162
The year	122,000	1,870	11,500	1.00	13.64	.646

Monthly discharge of Potomac River at Great Falls—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1898–99						
October	98,400	2,060	15,700	1.37	1.58	0.885
November	18,400	6,080	10,500	.916	1.02	.592
December	62,600	7,280	18,800	1.64	1.89	1.06
January	57,400	10,600	22,500	1.96	2.26	1.27
February	121,000	8,390	33,800	2.95	3.07	1.91
March	132,000	17,500	42,100	3.67	4.23	2.37
April	29,700	6,750	14,100	1.23	1.37	.795
May	56,200	6,230	13,400	1.17	1.35	.756
June	19,800	3,420	6,720	.586	.65	.379
July	8,040	1,900	2,980	.260	.30	.168
August	4,100	1,790	2,740	.239	.28	.154
September	3,950	2,010	2,890	.252	.28	.163
The year	132,000	1,790	15,500	1.35	18.28	.873
1899–1900						
October	2,440	1,790	1,960	0.171	0.20	0.111
November	11,700	2,370	3,930	.343	.38	.222
December	13,400	2,320	4,910	.428	.49	.277
January	40,800	4,320	10,000	.873	1.01	.564
February	50,200	3,780	17,400	1.52	1.58	.982
March	58,900	10,000	22,500	1.96	2.26	1.27
April	25,700	6,370	10,800	.942	1.05	.609
May	8,310	3,450	5,350	.467	.54	.302
June	54,200	3,020	9,440	.824	.92	.533
July	7,960	1,540	3,450	.301	.35	.195
August	4,160	1,510	2,260	.197	.23	.127
September	2,300	1,200	1,550	.135	.15	.087
The year	58,900	1,200	7,730	.675	9.16	.436
1900–1901						
October	3,020	1,380	1,560	0.136	0.16	0.088
November	52,500	1,150	5,470	.477	.53	.308
December	32,800	2,640	7,340	.640	.74	.414
January	24,300	2,110	5,860	.511	.59	.330
February	7,000	3,010	4,340	.379	.39	.245
March	95,200	2,760	17,400	1.52	1.75	.982
April	169,000	8,620	46,300	4.04	4.51	2.61
May	108,000	7,330	31,000	2.71	3.12	1.75
June	54,300	10,800	21,800	1.90	2.12	1.23
July	29,600	5,910	12,000	1.05	1.21	.679
August	23,400	4,610	9,570	.835	.96	.540
September	31,000	4,200	8,640	.754	.84	.487
The year	169,000	1,150	14,300	1.25	16.92	.808

Monthly discharge of Potomac River at Great Falls—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1901–2						
October	13,800	3,050	4,990	0.435	0.50	0.281
November	22,700	2,720	5,580	.487	.54	.315
December	150,000	5,360	30,400	2.65.	3.06	1.71
January	85,300	8,740	21,200	1.85	2.13	1.20
February	240,000	12,200	39,700	3.46	3.60	2.24
March	248,000	17,100	64,300	5.61	6.47	3.63
April	132,000	9,080	33,500	2.92	3.26	1.89
May	10,800	5,340	6,880	.600	.69	.388
June	5,070	2,940	3,820	.333	.37	.215
July	5,860	2,320	3,720	.325	.37	.210
August	4,900	1,740	2,840	.248	.29	.160
September	5,680	1,470	1,880	.164	.18	.106
The year	248,000	1,470	18,100	1.58	21.46	1.02
1902–3						
October	11,500	1,840	4,250	0.371	0.43	0.240
November	13,500	2,120	3,690	.322	.36	.208
December	63,100	8,710	24,600	2.15	2.48	1.39
January	80,600	8,780	22,400	1.95	2.25	1.26
February	56,400	15,400	27,600	2.41	2.51	1.56
March	116,000	10,800	32,800	2.85	3.29	1.84
April	123,000	11,300	35,300	3.08	3.44	1.99
May	18,400	5,200	7,760	.677	.78	.438
June	91,000	8,020	21,600	1.88	2.10	1.22
July	53,800	5,290	16,400	1.43	1.65	.924
August	13,200	3,450	6,400	.558	.64	.361
September	19,300	3,070	5,960	.520	.58	.336
The year	123,000	1,840	17,300	1.51	20.51	.976
1903–4						
October	8,780	2,430	4,020	0.351	0.40	0.227
November	3,280	2,430	2,630	.229	.26	.148
December	11,300	2,370	3,780	.330	.38	.213
January	39,900	3,920	9,100	.794	.92	.513
February	40,800	9,840	20,700	1.81	1.95	1.17
March	34,600	6,610	14,100	1.23	1.42	.795
April	31,200	4,110	8,860	.773	.86	.500
May	30,400	6,260	10,600	.925	1.07	.598
June	43,300	3,590	12,000	1.05	1.17	.679
July	14,200	2,950	5,480	.478	.55	.309
August	10,800	2,000	3,090	.270	.31	.175
September	2,620	1,520	2,010	.175	.20	.113
The year	43,300	1,520	7,980	.696	9.49	.450

Monthly discharge of Potomac River at Great Falls—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1904-5						
October	2,470	1,070	1,460	0.127	0.15	0.082
November	1,900	1,320	1,610	.140	.16	.090
December	8,980	1,780	3,000	.262	.30	.169
January	31,000	5,790	11,000	.960	1.11	.620
February	7,900	5,870	6,530	.570	.59	.368
March	76,500	8,030	28,900	2.52	2.90	1.63
April	12,000	4,860	8,020	.700	.78	.452
May	10,400	3,250	5,200	.454	.52	.293
June	37,500	3,220	8,420	.735	.82	.475
July	27,200	4,030	12,500	1.09	1.26	.704
August	24,300	3,350	7,910	.690	.80	.446
September	7,040	2,370	4,090	.357	.40	.231
The year	76,500	1,070	8,270	.722	9.79	.467
1905-6						
October	6,490	2,120	3,720	0.325	0.37	0.210
November	6,390	2,120	2,890	.252	.28	.163
December	48,100	4,200	13,900	1.21	1.40	.782
January	51,300	10,500	18,100	1.58	1.82	1.02
February	10,300	4,430	6,470	.565	.59	.365
March	94,500	5,460	19,800	1.73	1.99	1.12
April	75,100	9,780	27,600	2.41	2.69	1.56
May	12,100	3,340	6,530	.570	.66	.368
June	27,300	3,950	8,760	.764	.85	.494
July	10,000	3,000	5,080	.443	.51	.286
August	41,500	4,210	18,400	1.61	1.86	1.04
September	14,300	2,970	4,970	.434	.48	.281
The year	94,500	2,120	11,400	.995	13.50	.643
1906-7						
October	120,000	2,970	19,400	1.69	1.95	1.09
November	17,000	4,670	7,320	.639	.71	.413
December	64,000	4,650	13,700	1.20	1.38	.776
January	88,300	11,100	32,300	2.82	3.25	1.82
February	15,500	8,630	11,300	.986	1.03	.637
March	131,000	10,800	36,800	3.21	3.70	2.07
April	59,200	8,130	17,300	1.51	1.68	.976
May	43,300	7,990	12,800	1.12	1.29	.724
June	106,000	9,280	26,800	2.34	2.61	1.51
July	19,100	5,000	8,110	.708	.82	.458
August	10,200	3,560	4,590	.401	.46	.259
September	31,000	3,380	7,880	.688	.77	.445
The year	131,000	2,970	16,600	1.45	19.65	.937

Potomac River Basin—*Continued*

Monthly discharge of Potomac River at Great Falls—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1907–8						
October	7,220	2,670	4,300	0.375	0.43	0.242
November	34,300	3,160	10,200	.890	.99	.575
December	80,100	6,450	22,500	1.96	2.26	1.27
January	159,000	10,900	30,000	2.62	3.02	1.69
February	161,000	8,170	30,000	2.62	2.83	1.69
March	83,200	12,200	33,900	2.96	3.41	1.91
April	19,100	6,710	12,000	1.05	1.17	.679
May	150,000	7,130	39,500	3.45	3.98	2.23
June	17,500	4,620	8,340	.728	.81	.471
July	12,600	2,940	5,490	.479	.55	.310
August	9,190	2,920	4,570	.399	.46	.258
September	5,430	1,770	2,930	.256	.29	.165
The year	161,000	1,770	17,000	1.48	20.20	.957
1908–9						
October	6,830	2,040	3,250	0.284	0.33	0.184
November	3,280	2,320	3,080	.269	.30	.174
December	3,900	1,820	2,890	.252	.29	.163
January	35,700	3,410	8,330	.727	.84	.470
February	41,900	5,090	15,100	1.32	1.38	.853
March	20,100	5,960	11,300	.986	1.14	.637
April	82,400	5,460	19,600	1.71	1.91	1.11
May	18,200	5,730	9,690	.846	.98	.547
June	24,200	6,130	13,100	1.14	1.27	.737
July	8,340	1,700	3,120	.272	.31	.176
August	4,680	1,440	2,410	.210	.24	.136
September	2,760	1,540	2,040	.178	.20	.115
The year	82,400	1,440	7,750	.676	9.19	.437
1909–10						
October	5,560	1,160	2,480	0.216	0.25	0.140
November	2,540	1,700	2,110	.184	.21	.119
December	13,300	1,980	4,140	.361	.42	.233
January	106,000	2,560	14,600	1.27	1.46	.821
February	56,400	5,360	17,500	1.53	1.59	.989
March	40,400	3,930	11,900	1.04	1.20	.672
April	45,200	3,190	12,300	1.07	1.19	.692
May	14,200	4,520	6,450	.563	.65	.364
June	172,000	4,230	30,000	2.62	2.92	1.69
July	10,200	3,010	6,270	.547	.63	.354
August	3,850	1,660	2,360	.206	.24	.133
September	3,350	1,020	1,960	.171	.19	.111
The year	172,000	1,020	9,240	.806	10.95	.521

Monthly discharge of Potomac River at Great Falls—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1910–11						
October	2,400	1,520	1,760	0.154	0.18	0.100
November	1,840	1,390	1,640	.143	.16	.092
December	3,780	1,590	2,430	.212	.24	.137
January	63,700	2,410	14,000	1.22	1.41	.789
February	65,800	7,080	13,200	1.15	1.20	.743
March	20,900	5,860	11,400	.995	1.15	.643
April	57,800	7,980	17,600	1.54	1.72	.995
May	9,780	2,620	5,030	.439	.51	.284
June	8,720	2,830	4,310	.376	.42	.243
July	4,760	828	2,520	.220	.25	.142
August	47,400	1,140	4,080	.356	.41	.230
September	119,000	4,130	15,000	1.31	1.46	.847
The year	119,000	828	7,690	.671	9.11	.434
1911–12						
October	37,600	4,600	9,990	0.872	1.01	0.564
November	15,000	3,720	7,480	.653	.73	.422
December	36,400	4,090	12,600	1.10	1.27	.711
January	—	—	11,100	.969	1.12	.626
February	94,800	7,600	20,100	1.75	1.89	1.13
March	94,000	10,100	35,400	3.09	3.56	2.00
April	42,700	7,810	17,500	1.53	1.71	.989
May	75,800	7,080	22,200	1.94	2.24	1.25
June	8,400	4,030	6,140	.536	.60	.346
July	50,800	4,460	9,860	.860	.99	.556
August	8,810	2,460	4,240	.370	.43	.239
September	57,800	1,940	8,450	.737	.82	.476
The year	94,800	1,940	13,800	1.20	16.37	.776
1912–13						
October	8,690	2,330	3,610	0.315	0.36	0.204
November	8,480	2,490	3,900	.340	.38	.220
December	19,100	2,490	4,620	.403	.46	.260
January	36,600	7,620	14,600	1.27	1.46	.821
February	10,200	4,350	7,110	.620	.65	.401
March	143,000	4,020	22,500	1.96	2.26	1.27
April	70,900	9,610	19,300	1.68	1.87	1.09
May	74,400	4,390	15,500	1.35	1.56	.873
June	56,000	3,080	11,700	1.02	1.14	.659
July	9,540	3,100	5,120	.447	.52	.289
August	6,620	1,870	3,500	.305	.35	.197
September	9,030	848	2,260	.197	.22	.127
The year	143,000	848	9,500	.829	11.23	.536

Monthly discharge of Potomac River at Great Falls—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1913–14						
October	50,700	2,080	8,620	0.752	0.87	0.486
November	58,800	3,800	15,300	1.34	1.50	.866
December	29,800	4,850	10,300	.899	1.04	.581
January	56,400	9,510	23,700	2.07	2.39	1.34
February	47,500	7,190	18,700	1.63	1.70	1.05
March	77,700	6,760	22,800	1.99	2.29	1.29
April	58,900	12,100	24,200	2.11	2.35	1.36
May	26,500	3,690	11,400	.995	1.15	.643
June	5,470	2,450	3,730	.325	.36	.210
July	10,300	1,130	3,860	.337	.39	.218
August	5,210	912	2,220	.194	.22	.125
September	3,150	653	1,460	.127	.14	.082
The year	77,700	653	12,200	1.06	14.40	.685
1914–15						
October	3,140	816	1,610	0.140	0.16	0.090
November	3,860	775	1,920	.168	.19	.109
December	18,300	1,300	7,010	.612	.71	.396
January	95,800	5,500	34,700	3.03	3.49	1.96
February	140,000	11,800	32,800	2.86	2.98	1.85
March	19,100	5,470	9,680	.845	.97	.546
April	6,580	3,610	5,050	.441	.49	.285
May	19,500	3,720	6,900	.602	.69	.389
June	141,000	4,100	23,600	2.06	2.30	1.33
July	3,850	2,330	3,090	.270	.31	.175
August	36,900	1,480	9,580	.836	.96	.540
September	15,600	3,520	6,990	.610	.68	.394
The year	141,000	775	11,800	1.03	13.93	.666
1915–16						
October	38,600	2,790	7,940	0.693	0.80	0.448
November	7,120	1,690	4,310	.376	.42	.243
December	54,400	2,770	8,550	.746	.86	.482
January	31,600	7,190	14,600	1.27	1.46	.821
February	48,900	10,800	18,500	1.61	1.74	1.04
March	142,000	8,920	29,000	2.53	2.92	1.64
April	43,000	11,600	22,900	2.00	2.23	1.29
May	18,400	5,820	9,110	.795	.92	.514
June	67,200	4,340	17,600	1.54	1.72	.995
July	42,600	2,890	8,630	.753	.87	.487
August	6,780	2,510	4,240	.370	.43	.239
September	9,880	1,310	3,250	.284	.32	.184
The year	142,000	1,310	12,400	1.08	14.69	.698

Monthly discharge of Potomac River at Great Falls—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1916–17						
October	10,500	1,330	2,860	0.250	0.29	0.162
November	2,740	1,200	1,860	.162	.18	.105
December	27,600	1,670	4,430	.387	.45	.250
January	33,100	4,570	11,400	.995	1.15	.643
February	22,400	5,620	9,050	.790	.82	.511
March	133,000	14,000	44,300	3.87	4.46	2.50
April	29,600	6,030	12,800	1.12	1.25	.724
May	16,800	2,860	6,570	.573	.66	.370
June	23,500	2,410	9,430	.823	.92	.532
July	7,970	2,890	5,010	.437	.50	.282
August	11,200	1,520	3,560	.311	.36	.201
September	4,600	923	2,040	.178	.20	.115
The year	133,000	923	9,480	.827	11.24	.535
1917–18						
October	37,500	1,060	6,770	0.591	0.68	0.382
November	23,600	1,690	4,830	.421	.47	.272
December	—	—	3,080	.269	.31	.174
January	—	—	3,170	.277	.32	.179
February	112,000	—	34,400	3.00	3.12	1.94
March	50,400	5,450	16,300	1.42	1.64	.918
April	126,000	5,000	46,000	4.01	4.47	2.59
May	18,800	3,500	7,290	.636	.73	.411
June	6,720	2,660	3,920	.342	.38	.221
July	5,450	2,460	3,870	.338	.39	.218
August	4,240	2,520	3,370	.294	.34	.190
September	7,850	2,240	4,430	.387	.43	.250
The year	126,000	1,060	11,200	.977	13.28	.631
1918–19						
October	3,280	1,280	1,960	0.171	0.20	0.111
November	9,730	2,480	6,380	.557	.62	.360
December	50,800	2,850	15,300	1.34	1.54	.866
January	57,000	8,530	17,600	1.54	1.78	.995
February	12,800	4,750	7,430	.648	.67	.419
March	32,500	8,080	15,500	1.35	1.56	.873
April	16,200	6,320	10,600	.925	1.03	.598
May	72,400	5,770	21,300	1.86	2.14	1.20
June	16,000	4,750	8,410	.734	.82	.474
July	26,600	2,490	8,950	.781	.90	.505
August	6,620	1,840	3,730	.325	.37	.210
September	3,540	1,480	2,140	.187	.21	.121
The year	72,400	1,280	10,000	.873	11.84	.564

POTOMAC RIVER BASIN—*Continued*

Monthly discharge of Potomac River at Great Falls—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1919–20						
October	5,600	1,240	2,900	0.253	0.29	0.164
November	16,600	3,100	6,010	.524	.59	.339
December	13,900	4,310	8,380	.731	.84	.472
January	—	—	12,500	1.09	1.26	.704
February	—	—	21,500	1.88	2.03	1.22
March	122,000	10,800	38,800	3.39	3.91	2.19
April	36,800	10,900	17,100	1.49	1.66	.963
May	15,300	5,500	10,000	.873	1.01	.564
June	20,600	4,540	9,620	.839	.94	.542
July	—	—	—	—	—	—

Yearly discharge of Potomac River at Great Falls

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1886					12,511	1.09	14.68	0.704
1887					11,880	1.04	13.99	.672
1888					15,365	1.34	18.18	.866
1889					32,913	2.87	35.96	1.85
1890					21,368	1.86	25.22	1.20
1891					26,928	2.35	31.39	1.52
Highest					32,913	2.87	35.96	1.85
Average					20,160	1.76	23.89	1.14
Lowest					11,880	1.04	13.99	.672
1897	13,700	1.20	16.21	0.776				
1898	11,500	1.00	13.64	.646				
1899	15,500	1.35	18.28	.873				
1900	7,730	.675	9.16	.436				
1901	14,300	1.25	16.92	.808				
1902	18,100	1.58	21.46	1.02				
1903	17,300	1.51	20.51	.976				
1904	7,980	.696	9.49	.450				
1905	8,270	.722	9.79	.467				
1906	11,400	.995	13.50	.643				
1907	16,600	1.45	19.65	.937				
1908	17,000	1.48	20.20	.957				
1909	7,750	.676	9.19	.437				
1910	9,240	.806	10.95	.521				
1911	7,690	.671	9.11	.434				
1912	13,800	1.20	16.37	.776				
1913	9,500	.829	11.23	.536				
1914	12,200	1.06	14.40	.685				
1915	11,800	1.03	13.93	.666				
1916	12,400	1.08	14.69	.698				
1917	9,480	.827	11.24	.535				
1918	11,200	.977	13.28	.631				
1919	10,000	.873	11.84	.564				
1920	—	—	—	—				
Highest	18,100	1.58	21.46	1.02				
Average	11,930	1.04	14.13	.673				
Lowest	7,690	.671	9.11	.434				

Potomac River Basin

18. Potomac River near Washington, D. C.

Location.—Water-stage recorder, lat. 38°57′36″, long. 77°08′33″ on right bank 1¼ miles northeast of Langley, Fairfax County, Va., 2 miles upstream from District of Columbia boundary line, and 2½ miles upstream from Chain Bridge. Datum of gage is 38.00 feet above mean sea level, adjustment of 1912. Prior to June 7, 1930, staff gage at same site and datum.

Drainage area.—11,560 square miles.

Records available.—March 1930 to September 1952.

Average discharge.—22 water years, 11,410 second-feet (adjusted for diversions).

Extremes.—Maximum discharge, 484,000 second-feet Mar. 19, 1936 (gage height, 28.1 feet); minimum daily, 448 second-feet Aug. 25, 1930 (includes flow in both river and Chesapeake and Ohio Canal but does not include 334 second-feet diverted at Great Falls for water supply).

Flood of June 2, 1889, was of approximately the same magnitude as that of Mar. 19, 1936.

Remarks.—Records excellent except those for periods of doubtful or no gage-height record, once-daily gage readings, or shifting control, which are good. Records include flow in Chesapeake & Ohio Canal, but, except those adjusted for diversion, do not include water diverted at Great Falls through aqueducts for municipal water supply of Washington, D. C. Low flow affected slightly by Stony River Reservoir and since December 1950 by Savage River Reservoir, both tributaries of the North Branch Potomac River.

Cooperation.—Records of flow through aqueducts furnished by Corps of Engineers.

Monthly discharge of Potomac River near Washington, D. C.

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1943–44						
October	5,350	854	1,561	0.163	0.19	0.105
November	20,300	1,680	3,857	.365	.41	.236
December	3,000	1,050	1,536	.165	.19	.107
January	31,100	2,600	7,831	.708	.82	.458
February	30,000	2,800	8,375	.756	.82	.489
March	71,800	14,600	30,530	2.67	3.08	1.73
April	33,500	11,200	17,980	1.59	1.77	1.03
May	73,300	7,350	17,330	1.53	1.76	.989
June	9,120	3,060	4,925	.456	.51	.295
July	3,410	1,380	1,817	.189	.22	.122
August	2,240	854	1,149	.131	.15	.085
September	11,300	854	2,505	.247	.28	.160
The year	73,300	854	8,293	.748	10.20	.483

Monthly discharge of Potomac River near Washington, D. C.—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1944–45						
October	28,400	2,070	5,842	0.535	0.62	0.346
November	4,670	2,110	2,817	.274	.31	.177
December	22,400	3,830	8,909	.802	.92	.518
January	24,800	6,400	10,100	.899	1.04	.581
February	48,600	4,300	16,740	1.47	1.53	.950
March	55,500	8,480	21,720	1.91	2.20	1.23
April	25,100	7,040	10,780	.962	1.07	.622
May	20,300	7,700	11,730	1.04	1.20	.672
June	13,500	3,420	6,177	.563	.63	.364
July	14,700	2,220	5,874	.538	.62	.348
August	41,800	2,290	9,459	.848	.98	.548
September	130,000	3,570	19,940	1.75	1.95	1.13
The year	130,000	2,070	10,800	.964	13.07	.623
1945–46						
October	13,800	2,950	5,553	0.510	0.59	0.330
November	42,000	2,860	8,039	.725	.81	.469
December	35,400	6,700	15,730	1.39	1.60	.898
January	37,600	8,400	17,420	1.53	1.76	.989
February	22,700	8,900	12,340	1.09	1.14	.704
March	27,600	12,400	17,330	1.53	1.76	.989
April	21,100	5,410	9,081	.817	.91	.528
May	31,700	6,270	15,370	1.36	1.57	.879
June	58,800	5,580	14,930	1.32	1.47	.853
July	5,840	2,180	4,104	.386	.44	.249
August	13,400	2,020	4,304	.402	.46	.260
September	7,420	1,000	2,228	.221	.25	.143
The year	58,800	1,000	10,540	.941	12.76	.608
1946–47						
October	9,350	1,810	3,476	0.330	0.38	0.213
November	5,230	2,030	2,647	.259	.29	.167
December	5,620	1,640	2,587	.254	.29	.164
January	20,600	7,740	12,438	1.11	1.28	.717
February	15,800	3,240	6,878	.627	.65	.405
March	40,800	3,700	12,569	1.12	1.29	.724
April	10,600	5,420	7,202	.655	.73	.423
May	20,200	6,010	10,580	.946	1.09	.611
June	12,300	3,650	7,102	.645	.72	.417
July	14,000	2,890	6,256	.573	.66	.370
August	9,980	1,950	4,230	.398	.46	.257
September	3,960	1,500	2,261	.225	.25	.145
The year	40,800	1,500	6,535	.596	8.09	.385

Monthly discharge of Potomac River near Washington, D. C.—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1947–48						
October	1,930	1,080	1,438	0.151	0.17	0.098
November	10,600	1,740	5,960	.547	.61	.354
December	5,620	2,300	3,555	.339	.39	.219
January	32,900	3,100	8,877	.801	.92	.518
February	52,000	3,000	13,680	1.22	1.32	.789
March	30,500	9,700	17,670	1.56	1.80	1.01
April	91,600	9,400	22,130	1.94	2.16	1.25
May	42,000	6,450	17,580	1.54	1.78	.995
June	14,600	4,980	7,866	.709	.79	.458
July	14,200	3,150	5,054	.466	.54	.301
August	10,600	3,250	6,495	.591	.68	.382
September	4,090	2,170	2,917	.281	.31	.182
The year	91,600	1,080	9,409	.843	11.47	.545
1948–49						
October	26,700	2,580	9,204	0.827	0.95	0.535
November	27,800	3,700	11,020	.985	1.10	.637
December	81,600	11,200	28,950	2.54	2.93	1.64
January	69,000	13,600	32,820	2.87	3.31	1.85
Feburary	37,100	18,600	24,390	2.13	2.22	1.38
March	17,800	9,520	12,530	1.11	1.28	.717
April	42,900	8,160	15,250	1.34	1.50	.866
May	20,400	8,200	11,430	1.02	1.18	.659
June	117,000	3,300	13,780	1.22	1.36	.789
July	82,300	6,440	21,040	1.85	2.13	1.20
August	19,600	4,180	7,780	.701	.81	.453
September	17,000	2,590	5,154	.473	.53	.306
The year	117,000	2,580	16,100	1.42	19.30	.918
1949–50						
October	4,940	2,090	2,738	0.265	0.31	0.171
November	12,400	3,360	5,650	.518	.58	.335
December	23,300	4,100	8,692	.782	.90	.505
January	14,800	5,600	8,638	.779	.90	.503
February	74,400	9,700	26,120	2.28	2.37	1.47
March	56,500	7,160	19,250	1.69	1.95	1.09
April	21,400	6,480	9,926	.891	.99	.576
May	41,300	9,110	17,010	1.50	1.73	.969
June	27,500	4,290	10,400	.928	1.04	.600
July	7,430	2,900	4,212	.391	.45	.253
August	3,500	1,570	2,224	.220	.25	.142
September	30,700	2,270	10,110	.902	1.01	.583
The year	74,400	1,570	10,300	.920	12.48	.595

POTOMAC RIVER BASIN—*Continued*

Monthly discharge of Potomac River near Washington, D. C.—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950-51						
October	17,100	3,600	6,553	0.596	0.69	0.385
November	64,800	4,500	12,100	1.08	1.20	.698
December	126,000	9,400	30,900	2.71	3.12	1.75
January	31,800	9,110	16,190	1.43	1.65	.924
February	55,200	17,100	32,640	2.86	2.98	1.85
March	38,200	13,400	21,050	1.84	2.12	1.19
April	68,700	13,000	27,020	2.37	2.64	1.53
May	22,300	6,130	13,140	1.17	1.35	.756
June	104,000	5,690	19,090	1.68	1.87	1.09
July	10,000	3,710	5,604	.513	.59	.332
August	4,620	1,810	2,804	.271	.31	.175
September	2,070	1,330	1,792	.181	.20	.117
The year	126,000	1,330	15,610	1.38	18.72	.892
1951-52						
October	1,830	1,230	1,499	0.156	0.18	0.101
November	5,500	1,790	2,926	.276	.31	.178
December	20,000	2,900	7,384	.663	.76	.429
January	64,600	13,800	25,420	2.23	2.57	1.44
February	56,500	8,260	18,560	1.64	1.77	1.06
March	102,000	7,980	26,740	2.34	2.70	1.51
April	146,000	13,400	34,710	3.03	3.38	1.96
May	68,700	14,400	25,950	2.28	2.63	1.47
June	13,000	4,850	7,552	.681	.76	.440
July	15,500	2,220	5,355	.492	.57	.318
August	6,230	2,220	3,462	.326	.38	.211
September	22,800	2,420	6,186	.563	.63	.364
The year	146,000	1,230	13,800	1.22	16.64	.789

POTOMAC RIVER BASIN—*Continued*

Yearly discharge of Potomac River near Washington, D. C.

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1931	5,840	0.505	6.85	0.326	6,020	0.521	7.06	0.337
1932	8,250	.714	9.72	.461	10,900	.943	12.83	.609
1933	15,600	1.35	18.32	.873	13,400	1.16	15.71	.750
1934	6,470	.560	7.62	.362	8,044	.696	9.45	.450
1935	12,700	1.10	14.91	.711	11,800	1.02	13.86	.659
1936	15,780	1.37	18.60	.885	16,010	1.38	18.88	.892
1937	15,580	1.35	18.32	.873	18,280	1.58	21.48	1.02
1938	10,440	.903	12.26	.584	7,200	.623	8.45	.403
1939	10,810	.935	12.68	.604	10,690	.925	12.53	.598
1940	11,090	.959	13.05	.620	12,460	1.08	14.67	.698
1941	8,935	.773	10.48	.500	7,002	.606	8.21	.392
1942	8,761	.758	10.29	.490	14,310	1.24	16.80	.801
1943	16,330	1.41	19.16	.911	10,860	.939	12.74	.607
1944	8,649	.748	10.20	.483	9,550	.826	11.26	.534
1945	11,140	.964	13.07	.623	12,120	1.05	14.22	.679
1946	10,880	.941	12.76	.608	9,141	.791	10.72	.511
1947	6,892	.596	8.09	.385	7,074	.612	8.30	.396
1948	9,749	.843	11.47	.545	12,980	1.12	15.28	.724
1949	16,420	1.42	19.30	.918	13,700	1.19	16.11	.769
1950	10,630	.920	12.48	.595	13,380	1.16	15.70	.750
1951	15,950	1.38	18.72	.892	12,750	1.10	14.96	.711
1952	14,120	1.22	16.64	.789				
Highest	16,420	1.42	19.30	.918	18,280	1.58	21.48	1.02
Average	11,410	.987	13.40	.638	11,320	.979	13.29	.633
Lowest	5,840	.505	6.85	.326	6,020	.521	7.06	.337

Note: All figures in Yearly table adjusted for diversion at Great Falls through aqueducts for municipal water supply of Washington, D. C.

Potomac River Basin

19. Little Falls Branch near Bethesda

Location.—Water-stage recorder and concrete control, lat. 38°57′27″, long. 77°06′31″, on left bank at downstream side of bridge on Massachusetts Avenue, 2.0 miles southwest of Bethesda, Montgomery County.

Drainage area.—4.1 square miles.

Records available.—June 1944 to September 1952.

Average discharge.—8 water years (1945–52), 3.47 second-feet.

Extremes.—Maximum discharge, 2,340 second-feet July 31, 1945 (gage height, 7.50 feet), from rating curve extended above 630 second-feet on basis of slope-area determination at gage height 5.63 feet; no flow at times in 1944.

Remarks.—Records good except those for periods of doubtful, fragmentary, or no gage-height record or backwater from ice or unknown cause, which are fair.

Monthly discharge of Little Falls Branch near Bethesda

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1944						
June 19–30	44	0.15	4.00	0.976	0.44	0.631
July	5.8	0	.301	.073	.08	.047
August	95	0	3.25	.793	.91	.513
September	77	0	3.16	.771	.86	.498
1944–45						
October	11	0.33	1.50	0.366	0.42	0.237
November	29	.25	2.04	.498	.56	.322
December	30	.68	3.21	.783	.90	.506
January	56	.90	4.40	1.07	1.24	.692
February	13	1.0	3.17	.773	.80	.500
March	4.8	1.1	2.35	.573	.66	.370
April	13	.70	1.98	.483	.54	.312
May	6.2	.54	1.72	.420	.48	.271
June	14	.42	3.46	.844	.94	.545
July	127	.39	16.3	3.98	4.57	2.57
August	41	.50	2.81	.685	.79	.443
September	59	.33	4.04	.985	1.10	.637
The year	127	.25	3.93	.959	13.00	.620

Monthly discharge of Little Falls Branch near Bethesda—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1945–46						
October	5.0	0.58	0.962	0.235	0.27	0.152
November	44	.50	3.48	.849	.95	.549
December	30	1.6	5.31	1.30	1.49	.840
January	9.0	1.5	2.99	.729	.84	.471
February	13	1.8	4.04	.985	1.03	.637
March	9.3	1.5	3.04	.741	.85	.479
April	5.4	1.1	1.51	.368	.41	.238
May	89	1.1	7.07	1.72	1.99	1.11
June	68	.50	3.90	.951	1.06	.615
July	47	.30	2.39	.583	.67	.377
August	18	.18	1.17	.285	.33	.184
September	9.1	.10	1.08	.263	.29	.170
The year	89	.10	3.08	.751	10.18	.485
1946–47						
October	4.9	0.18	0.624	0.152	0.18	0.098
November	4.0	.22	.444	.108	.12	.070
December	10.0	.17	.857	.209	.24	.135
January	16.0	.62	2.78	.678	.78	.438
February	.90	.35	.642	.157	.16	.101
March	4.9	.58	1.75	.427	.49	.276
April	41	.68	2.57	.627	.70	.405
May	44	.62	3.70	.902	1.04	.583
June	19.0	.58	2.65	.646	.72	.418
July	42	.42	3.39	.827	.95	.535
August	8.1	.22	.888	.217	.25	.140
September	7.8	.17	.907	.221	.25	.143
The year	44	.17	1.78	.434	5.88	.281
1947–48						
October	4.5	0.2	0.50	0.122	0.14	0.079
November	40	.4	3.52	.859	.96	.555
December	6.2	.4	.97	.237	.27	.153
January	30	.8	3.70	.902	1.04	.583
February	38	.8	3.50	.854	.92	.552
March	19	1.9	4.27	1.04	1.20	.672
April	18	2.7	4.25	1.04	1.16	.672
May	80	1.8	8.84	2.16	2.49	1.40
June	35	.8	5.43	1.32	1.48	.853
July	7.0	.5	1.22	.298	.34	.193
August	52	.6	7.35	1.79	2.07	1.16
September	5.6	.3	1.05	.256	.29	.165
The year	80	.2	3.72	.907	12.36	.586

Monthly discharge of Little Falls Branch near Bethesda—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948–49						
October	11	0.3	1.11	0.271	0.31	0.175
November	53	.5	6.27	1.53	1.71	.989
December	39	1.9	6.36	1.55	1.79	1.00
January	42	2.7	6.50	1.59	1.83	1.03
February	23	3.0	6.22	1.52	1.58	.982
March	19	2.1	3.49	.851	.98	.550
April	8.0	1.8	3.02	.737	.82	.476
May	36	1.6	5.25	1.28	1.47	.827
June	16	.9	1.86	.454	.51	.293
July	17	.4	2.14	.522	.60	.337
August	13	.3	1.84	.449	.52	.290
September	13	.2	1.80	.439	.49	.284
The year	53	.2	3.81	.929	12.61	.600
1949–50						
October	15	0.3	1.85	0.451	0.52	0.291
November	4.0	.4	.75	.183	.20	.118
December	3.4	.4	1.07	.261	.30	.169
January	5.4	.6	1.14	.278	.32	.180
February	12	.8	3.17	.773	.80	.500
March	55	.7	3.89	.949	1.09	.613
April	2.3	.8	1.14	.278	.31	.180
May	44	.7	4.20	1.02	1.18	.659
June	147	.5	7.11	1.73	1.93	1.12
July	34	.3	2.85	.695	.80	.449
August	69	.2	3.97	.968	1.12	.626
September	83	.3	5.58	1.36	1.52	.879
The year	147	.2	3.05	.744	10.09	.481
1950–51						
October	24	0.60	2.26	0.551	0.64	0.356
November	49	.54	3.59	.876	.98	.566
December	113	.93	6.91	1.69	1.94	1.09
January	6.7	1.2	2.23	.544	.63	.352
February	56	2.1	6.41	1.56	1.63	1.01
March	22	1.9	4.03	.983	1.13	.635
April	26	1.9	5.04	1.23	1.37	.795
May	9.0	.84	1.74	.424	.49	.274
June	100	.76	12.4	3.02	3.38	1.95
July	2.0	.50	.951	.232	.27	.150
August	6.7	.16	.596	.145	.17	.094
September	16	.11	1.08	.263	.30	.170
The year	113	.11	3.90	.951	12.93	.615

POTOMAC RIVER BASIN—*Continued*

Monthly discharge of Little Falls Branch near Bethesda—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	5.0	0.10	0.376	0.092	0.11	0.059
November	51	.42	4.31	1.05	1.17	.679
December	50	.50	3.51	.856	.99	.553
January	22	1.3	4.72	1.15	1.33	.743
February	23	1.5	3.34	.815	.88	.527
March	38	1.8	5.54	1.35	1.56	.873
April	90	2.1	11.9	2.90	3.24	1.87
May	27	2.1	6.72	1.64	1.89	1.06
June	51	1.2	4.57	1.11	1.24	.717
July	22	.40	2.54	.620	.71	.401
August	29	.28	2.21	.539	.62	.348
September	111	.28	4.63	1.13	1.26	.730
The year	111	.10	4.52	1.10	15.00	.711

Yearly discharge of Little Falls Branch near Bethesda

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1945	3.93	0.959	13.00	0.620	4.18	1.02	13.83	0.659
1946	3.08	.751	10.18	.485	2.42	.590	8.01	.381
1947	1.78	.434	5.88	.281	2.03	.495	6.71	.320
1948	3.72	.907	12.36	.586	4.45	1.09	14.80	.704
1949	3.81	.929	12.61	.600	2.97	.724	9.82	.468
1950	3.05	.744	10.09	.481	3.82	.932	12.63	.602
1951	3.90	.951	12.93	.615	3.51	.856	11.64	.553
1952	4.52	1.10	15.00	.711				
Highest	4.52	1.10	15.00	.711	4.45	1.09	14.80	.704
Average	3.47	.847	11.48	.547	3.34	.815	11.06	.527
Lowest	1.78	.434	5.88	.281	2.03	.495	6.71	.320

Potomac River Basin

20. Potomac River (at Chain Bridge) at Washington, D. C.

Location.—Wire-weight gage on right side of Chain Bridge, at Washington, D. C., 0.4 mile downstream from Little Falls (head of tidewater), 3.3 miles upstream from Key Bridge, Georgetown, D. C., and 10.4 miles downstream from Washington Aqueduct dam, Great Falls, Montgomery County.

Drainage area.—11,570 square miles (revised; published in 1893 as 11,161 square miles).

Records available.—January 1892 to December 1893 (discontinued) in 14th Annual Report, Part 2, U. S. Geological Survey (monthly discharges only); unpublished gage heights in files for May 4, 1891 to May 4, 1893, Dec. 19, 1894 to Feb. 22, 1896, and Nov. 21, 1910 to Dec. 31, 1910.

Average discharge.—2 calendar years (1892–1893), 14,640 second-feet.

Extremes.—Maximum daily discharge, 198,060 second-feet during May 1893; minimum daily discharge, 1,900 second-feet during December 1892.

History.—Haskell electric current-meter measurements were made from Chain Bridge or from cable 150 feet upstream. Daily discharge for 1886–1891 of Great Falls was computed on basis of these measurements by means of a stage-relationship curve based on observations at Chain Bridge and at Aqueduct dam. (see records for Potomac River at Great Falls, Md.)

Remarks.—River stage read three-times daily, which tended to eliminate to some degree the influence of the tides (3-foot daily range). No adjustments were made in these computations for diversion at Aqueduct dam for water supply or for flow in the Chesapeake and Ohio Canal.

Monthly discharge of Potomac River (at Chain Bridge) at Washington, D. C.

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1892						
January	147,200	3.580	30,774	2.66	3.07	1.72
February	31,100	5,030	10,190	.88	.95	.569
March	143,600	7,250	46,395	4.01	4.62	2.59
April	112,300	6,030	35,589	3.08	3.44	1.99
May	24,800	4,290	10,920	.94	1.08	.608
June	47,200	4,600	13,584	1.17	1.30	.756
July	9,200	2,620	3,419	.30	.35	.194
August	7,250	2,200	3,747	.32	.37	.207
September	31,800	2,460	4,616	.40	.45	.259

POTOMAC RIVER BASIN—*Continued*

Monthly discharge of Potomac River (at Chain Bridge) at Washington, D. C.—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1892–93						
October	5,460	2,050	2,952	0.26	0.30	0.168
November	11,150	2,100	3,392	.29	.32	.187
December	30,400	1,900	5,009	.43	.50	.278
January	9,850	2,800	5,264	.45	.52	.291
February	69,600	5,460	17,205	1.49	1.55	.963
March	98,000	3,780	26,300	2.27	2.62	1.47
April	49,300	2,800	16,064	1.39	1.55	.898
May	198,060	9,200	33,266	2.88	3.32	1.86
June	37,400	3,780	10,921	.94	1.05	.608
July	9,850	2,460	4,490	.39	.45	.252
August	18,300	2,800	5,527	.48	.55	.310
September	43,000	3,410	13,804	1.19	1.33	.769
The year	198,060	1,900				
1893						
October	188,200	3,410	30,253	2.61	3.01	1.69
November	48,600	2,260	12,373	1.07	1.19	.692
December 1–31	22,200	2,390	5,366	.46	.53	.297

Yearly discharge of Potomac River (at Chain Bridge) at Washington, D. C.

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1892					14,216	1.23	16,75	0.795
1893					15,069	1.30	17.67	.840

21. Rock Creek at Sherrill Drive, Washington, D. C.

Location.—Water-stage recorder and concrete control, lat. 38°58′21″, long. 77°02′25″, on left bank 600 feet downstream from Sherrill Drive bridge in Rock Creek Park in Washington, District of Columbia, and 7½ miles upstream from mouth. Datum of gage is 148.99 feet above mean sea level, adjustment of 1912.

Drainage area.—62.2 square miles.

Records available.—October 1929 to September 1952.

Average discharge.—23 water years (1930–52), 56.2 second-feet.

Extremes.—Maximum discharge, 4,460 second-feet Aug. 24, 1933 (gage height, 11.6 feet), from rating curve extended above 3,200 second-feet; minimum, 0.5 second-foot Oct. 1–7, 1930 (gage height, 1.04 feet).

Remarks.—Records excellent except those for periods of ice effect, which are good, and those for periods of doubtful, partial or no gage-height record, which are fair.

Monthly discharge of Rock Creek at Sherrill Drive, Washington, D. C.

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1943–44						
October	150	7.1	17.9	0.288	0.33	0.186
November	780	20	59.9	.963	1.07	.622
December	267	16	31.6	.508	.59	.328
January	971	22	77.5	1.25	1.44	.808
February	66	22	34.1	.548	.59	.354
March	288	36	85.5	1.37	1.59	.885
April	197	47	70.2	1.13	1.26	.730
May	94	24	40.5	.651	.75	.421
June	56	14	23.6	.379	.42	.245
July	24	4.5	8.98	.144	.17	.093
August	181	3.4	15.6	.251	.29	.162
September	298	2.8	23.3	.375	.42	.242
The year	971	2.8	40.7	.654	8.92	.423
1944–45						
October	113	11	24.2	0.389	0.45	0.251
November	154	15	31.6	.508	.57	.328
December	408	24	57.8	.929	1.07	.600
January	565	33	88.3	1.42	1.64	.918
February	264	30	74.3	1.19	1.24	.769
March	134	38	56.5	.908	1.05	.587
April	155	33	45.9	.738	.82	.477
May	124	24	40.1	.645	.74	.417
June	532	21	66.2	1.06	1.19	.685
July	1,050	23	192	3.09	3.56	2.00
August	1,200	33	102	1.64	1.89	1.06
September	493	25	61.4	.987	1.10	.638
The year	1,200	11	70.2	1.13	15.32	.730

Monthly discharge of Rock Creek at Sherrill Drive, Washington, D. C.—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1945–46						
October	74	31	37.5	0.603	0.69	0.390
November	363	29	65.6	1.05	1.18	.679
December	702	43	114	1.83	2.11	1.18
January	172	50	78.9	1.27	1.46	.821
February	198	56	96.4	1.55	1.61	1.00
March	135	62	75.6	1.22	1.40	.789
April	75	44	51.3	.825	.92	.533
May	615	39	92.1	1.48	1.71	.957
June	346	29	66.9	1.08	1.20	.698
July	230	21	37.8	.608	.70	.393
August	203	16	30.7	.494	.57	.319
September	58	10	18.1	.291	.32	.188
The year	702	10	63.6	1.02	13.87	.659
1946–47						
October	37	14	20.8	0.334	0.39	0.216
November	49	18	23.6	.379	.42	.245
December	116	18	29.4	.473	.54	.306
January	124	29	56.7	.912	1.05	.589
February	47	25	34.8	.559	.58	.361
March	108	31	50.8	.817	.94	.528
April	64	30	38.4	.617	.69	.399
May	287	31	60.9	.979	1.13	.633
June	173	22	40.1	.645	.72	.417
July	82	15	29.5	.474	.55	.306
August	94	13	23.7	.381	.44	.246
September	62	11	20.5	.330	.37	.213
The year	287	11	35.8	.576	7.82	.372
1947–48						
October	69	12	16.0	0.257	0.30	0.166
November	315	14	58.9	.947	1.06	.612
December	77	23	31.2	.502	.58	.324
January	451	32	77.5	1.25	1.44	.808
February	622	38	92.3	1.48	1.60	.957
March	214	49	76.9	1.24	1.42	.801
April	171	41	58.7	.944	1.05	.610
May	350	41	105	1.69	1.94	1.09
June	650	32	74.3	1.19	1.33	.769
July	148	25	38.6	.621	.72	.401
August	276	26	71.4	1.15	1.32	.743
September	55	18	25.5	.410	.46	.265
The year	650	12	60.4	.971	13.22	.628

Monthly discharge of Rock Creek at Sherrill Drive, Washington, D. C.—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1948–49						
October	154	18	33.5	0.539	0.62	0.348
November	784	23	88.4	1.42	1.59	.918
December	620	52	119	1.91	2.20	1.23
January	706	70	146	2.35	2.71	1.52
February	285	93	141	2.27	2.36	1.47
March	511	72	109	1.75	2.03	1.13
April	204	64	88.2	1.42	1.58	.918
May	706	52	110	1.77	2.04	1.14
June	122	35	50.5	.812	.91	.525
July	159	28	48.2	.775	.89	.501
August	117	22	32.5	.523	.60	.338
September	83	16	26.5	.426	.48	.275
The year	784	16	82.5	1.33	18.01	.860
1949–50						
October	164	18	32.3	0.519	0.60	0.335
November	67	24	29.8	.479	.53	.310
December	125	24	42.3	.680	.78	.439
January	138	33	40.0	.643	.74	.416
February	333	36	91.8	1.48	1.54	.957
March	772	30	92.2	1.48	1.71	.957
April	59	41	47.8	.768	.86	.496
May	303	41	83.0	1.33	1.54	.860
June	411	33	85.1	1.37	1.53	.885
July	238	26	51.0	.820	.95	.530
August	240	16	34.4	.553	.64	.357
September	477	18	75.4	1.21	1.35	.782
The year	772	16	58.5	.941	12.77	.608
1950–51						
October	275	29	47.9	0.770	0.89	0.498
November	728	31	77.4	1.24	1.39	.801
December	700	43	104	1.67	1.93	1.08
January	169	50	67.1	1.08	1.24	.698
February	506	64	123	1.98	2.07	1.28
March	273	55	82.6	1.33	1.53	.860
April	280	55	88.4	1.42	1.59	.918
May	172	36	55.6	.894	1.03	.578
June	853	34	164	2.64	2.95	1.71
July	97	28	42.7	.686	.79	.443
August	86	14	22.9	.368	.43	.238
September	62	8.5	15.0	.241	.27	.156
The year	853	8.5	73.7	1.18	16.11	.763

POTOMAC RIVER BASIN—*Continued*

Monthly discharge of Rock Creek at Sherrill Drive, Washington, D. C.—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	28	7.8	13.5	0.217	0.25	0.140
November	279	18	45.9	.738	.82	.477
December	422	22	65.2	1.05	1.21	.679
January	226	52	93.4	1.50	1.73	.969
February	384	46	72.7	1.17	1.26	.756
March	274	52	89.8	1.44	1.66	.931
April	1,000	54	194	3.12	3.49	2.02
May	340	68	122	1.96	2.27	1.27
June	185	39	74.4	1.20	1.34	.776
July	648	26	72.1	1.16	1.34	.750
August	120	25	44.2	.711	.82	.460
September	1,800	29	110	1.77	1.97	1.14
The year	1,800	7.8	83.0	1.33	18.16	.860

Yearly discharge of Rock Creek at Sherrill Drive, Washington, D. C.

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1930	35.9	0.577	7.84	0.373	28.4	0.457	6.20	0.295
1931	16.1	.259	3.51	.167	16.4	.264	3.58	.171
1932	28.0	.450	6.12	.291	44.2	.711	9.67	.460
1933	77.9	1.25	16.98	.808	68.2	1.10	14.88	.711
1934	57.5	.924	12.53	.597	64.1	1.03	13.97	.666
1935	76.8	1.23	16.76	.795	73.5	1.18	16.03	.763
1936	72.3	1.16	15.82	.750	68.6	1.10	15.02	.711
1937	76.1	1.22	16.59	.789	95.7	1.54	20.87	.995
1938	65.1	1.05	14.22	.679	44.8	.720	9.76	.465
1939	50.2	.807	10.93	.522	50.4	.810	10.99	.524
1940	43.1	.693	9.42	.448	46.1	.741	10.09	.479
1941	40.0	.643	8.73	.416	32.3	.519	7.04	.335
1942	26.0	.418	5.64	.270	41.9	.476	9.13	.436
1943	58.2	.936	12.72	.605	48.6	.781	10.62	.505
1944	40.7	.654	8.92	.423	41.2	.662	9.02	.428
1945	70.2	1.13	15.32	.730	78.9	1.27	17.21	.821
1946	63.6	1.02	13.87	.659	51.6	.830	11.24	.536
1947	35.8	.576	7.82	.372	38.5	.619	8.41	.400
1948	60.4	.971	13.22	.628	71.7	1.15	15.69	.743
1949	82.5	1.33	18.01	.860	71.1	1.14	15.51	.737
1950	58.5	.941	12.77	.608	69.0	1.11	15.07	.717
1951	73.7	1.18	16.11	.763	64.9	1.04	14.18	.672
1952	83.0	1.33	18.16	.860				
Highest	83.0	1.33	18.16	.860	95.7	1.54	20.87	.995
Average	56.2	.904	12.27	.584	55.0	.884	12.00	.571
Lowest	16.1	.259	3.51	.167	16.4	.264	3.58	.171

Potomac River Basin

22. Rock Creek at Zoological Park at Washington, D. C.

Location.—Staff gage, on Park bridge, near the eastern entrance of the National Zoological Park, Washington, D. C.

Records available.—Jan. 18, 1897 to Nov. 10, 1900 (discontinued), gage heights only. During period Aug. 18, 1897 to Feb. 27, 1902 6 current-meter measurements were made at this site but no estimate of daily discharge was possible due to insufficient range of stage of these measurements. The staff gage was above but within the influences of a dam.

Extremes.—Gage heights only, discharge unknown. Subject to backwater from ice.

Remarks.—Gage was destroyed Nov. 10, 1900 when bridge was rebuilt. Results of 6 discharge measurements published in Bulletin No. 1, page 287.

Cooperation.—A study of the discharge the Rock Creek was begun at the request of the Commissioners of the District of Columbia.

23. Rock Creek at Q Street, Washington, D. C. (at Lyon's Mill)

Location.—Water-stage recorder, lat. 38°54'40", long. 77°03'06", on right bank, 100 feet upstream from Q Street bridge, Washington, D. C., and 1.1 miles upstream from mouth, and 6.4 miles downstream from gaging station on Sherrill Drive. Prior to Oct. 18, 1929, water-stage recorder 1,000 feet upstream at different datum at Lyon's Mill Road bridge at the east corner of Oak Hill Cemetery, Georgetown.

Drainage area.—75.8 square miles.

Records available.—August 1892 to December 1894 (at Lyon's Mill Road), October 1929 to September 1930, July 1931 to September 1933 (discontinued).

Extremes.—Maximum discharge, 4,650 second-feet Aug. 24, 1933 (gage height, 14.0 feet), from rating curve extended above 800 second-feet; minimum, 1.0 second-foot Sept. 7, 1930 (gage height, 1.65 feet); minimum daily, 1.2 second-feet Sept. 7, 10, 11, 1930.

Remarks.—Records good to fair. Winter discharge subject to ice effect.

Cooperation.—A study of the discharge of Rock Creek was begun at the request of the Commissioners of the District of Columbia.

Yearly discharge of Rock Creek at Q St., Washington, D. C.

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1892.......	—	—	—	—	—	—	—	—
1893.......	55.3	0.730	9.91	0.472	59.7	0.788	10.67	0.509
1894.......	—	—	—	—	—	—	—	—
1930.......	—	—	—	—	—	—	—	—
1931.......	—	—	—	—	—	—	—	—
1932.......	38.6	.509	6.93	.392	60.5	.798	10.85	.516
1933.......	103	1.36	18.49	.879	—	—	—	—

24. Northeast Branch Anacostia River at Riverdale

Location.—Water-stage recorder and concrete control, lat. 38°57′37″, long. 76°55′34″, on right bank at downstream side of bridge on Riverdale Road in Riverdale, Prince Georges County, 1¾ miles downstream from Indian Creek and 1¾ miles upstream from confluence with Northwest Branch. Datum of gage is 14.00 feet above mean sea level (Washington Suburban Sanitary Commission bench mark). Prior to June 12, 1942, wire-weight gage on bridge at same site and datum read twice-daily.

Drainage area.—72.8 square miles.

Records available.—August 1938 to September 1952. (August 1938 to September 1943 published in Bulletin 1; October 1943 to September 1950 in Bulletin 10).

Average discharge.—14 water years (1939–52), 81.9 second-feet.

Extremes.—Maximum discharge, 3,680 second-feet July 18, 1945; maximum gage height, 12.93 feet Oct. 16, 1942; minimum discharge observed, 5.6 second-feet Sept. 29, 30, Oct. 1, 1941 (gage height, 2.72 feet).

Maximum stage known, about 15.5 feet Aug. 23 or 24, 1933, from floodmarks (discharge, 10,500 second-feet, from rating curve extended above 3,000 second-feet on basis of velocity-area study).

Remarks.—Records good except those for periods of doubtful or no gage-height record, which are fair.

Monthly discharge of Northeast Branch Anacostia River at Riverdale

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950–51						
October	503	38	75.6	1.04	1.20	0.672
November	904	39	97.5	1.34	1.49	.866
December	604	50	131	1.80	2.08	1.16
January	225	57	82.8	1.14	1.31	.737
February	451	72	148	2.03	2.11	1.31
March	492	55	110	1.51	1.74	.976
April	484	70	121	1.66	1.85	1.07
May	160	39	59.0	.810	.93	.524
June	1,290	35	272	3.74	4.17	2.42
July	144	27	46.5	.639	.74	.413
August	147	18	33.6	.462	.53	.299
September	92	14	28.4	.390	.44	.252
The year	1,290	14	99.7	1.37	18.59	.885

POTOMAC RIVER BASIN—*Continued*

Monthly discharge of Northeast Branch Anacostia River at Riverdale—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	50	15	23.8	0.327	0.38	0.211
November	266	29	70.1	.963	1.07	.622
December	886	32	114	1.57	1.81	1.01
January	395	62	163	2.24	2.58	1.45
February	683	53	117	1.61	1.73	1.04
March	389	66	145	1.99	2.30	1.29
April	1,810	60	260	3.57	3.98	2.31
May	503	71	181	2.49	2.87	1.61
June	199	37	75.8	1.04	1.16	.672
July	224	26	49.0	.673	.78	.435
August	371	25	69.8	.959	1.11	.620
September	1,880	25	116	1.59	1.78	1.03
The year	1,880	15	115	1.58	21.55	1.02

Yearly discharge of Northeast Branch Anacostia River at Riverdale

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1939	69.1	0.949	12.88	0.613	68.8	0.945	12.83	0.611
1940	69.3	.952	12.94	.615	75.3	1.03	14.08	.666
1941	57.3	.787	10.70	.509	46.1	.633	8.60	.409
1942	54.8	.753	10.20	.487	85.1	1.17	15.85	.756
1943	88.8	1.22	16.56	.789	67.8	.931	12.65	.602
1944	65.9	.905	12.33	.585	67.9	.933	12.71	.603
1945	97.2	1.34	18.13	.866	108	1.48	20.20	.957
1946	80.0	1.10	14.92	.711	61.9	.850	11.53	.549
1947	59.4	.816	11.06	.527	67.5	.927	12.56	.599
1948	109	1.50	20.40	.969	125	1.72	23.42	1.11
1949	110	1.51	20.54	.976	86.5	1.19	16.14	.769
1950	71.6	.984	13.35	.636	87.5	1.20	16.31	.776
1951	99.7	1.37	18.59	.885	91.6	1.26	17.08	.814
1952	115	1.58	21.55	1.02				
Highest	115	1.58	21.55	1.02	125	1.72	23.42	1.11
Average	81.9	1.12	15.20	.724	79.9	1.10	14.93	.711
Lowest	54.8	.753	10.20	.487	46.1	.633	8.60	.409

25. Northwest Branch Anacostia River near Colesville

Location.—Water-stage recorder and concrete control, lat. 39°03′55″, long. 77°01′48″, on right bank 400 feet upstream from bridge on State Highway 183, 1½ miles southwest of Colesville, Montgomery County, 3 miles upstream from Burnt Mills, and 10 miles upstream from Sligo Branch. Datum of gage is 264.85 feet above mean sea level, adjustment of 1912. Prior to Apr. 18, 1932, staff gage at bridge at same datum. Apr. 18, 1932 to Apr. 11, 1934, staff gage at same site and datum. Both staff gages read twice daily.

Drainage area.—21.3 square miles.

Records available.—February 1924 to September 1952.

Average discharge.—28 years (1925–52), 22.3 second-feet (unadjusted); 20.8 second-feet (adjusted for diversion from Patuxent River).

Extremes.—Maximum discharge uncertain, occurred Aug. 23, 1933 (gage height, 9.3 feet, from floodmarks); maximum gage height, 9.74 feet Sept. 1, 1952; minimum discharge, 0.4 second-foot Aug. 11–12, 1930, Sept. 2, 1932.

Remarks.—Records good except those for periods of ice effect or doubtful or no gage-height record, which are fair. Records include inflow pumped to headwaters from Patuxent River since Aug. 12, 1939 to augment water supply for Washington Suburban Sanitary District. Records in last three columns of Monthly table adjusted for diversion from Patuxent River.

Cooperation.—Adjustments in Monthly and Yearly tables based on figures of pumpage from Patuxent River furnished by the Washington Suburban Sanitary Commission.

Monthly discharge of Northwest Branch Anacostia River near Colesville

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1943–44						
October	154	6.6	19.7	0.385	0.44	0.249
November	436	11	31.6	1.21	1.35	.782
December	152	12	20.5	.545	.63	.352
January	367	13	35.6	1.46	1.68	.944
February	26	9.5	15.9	.516	.56	.333
March	137	14	31.5	1.46	1.68	.944
April	57	14	21.3	1.00	1.12	.646
May	27	12	15.5	.526	.61	.340
June	30	6.6	18.1	.263	.29	.170
July	19	8.6	16.6	.047	.05	.030
August	66	7.8	14.0	.127	.15	.082
September	168	5.9	16.2	.390	.44	.252
The year	436	5.9	21.4	.662	9.00	.428

Monthly discharge of Northwest Branch Anacostia River near Colesville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1944–45						
October	38	5.9	11.4	0.396	0.460	0.256
November	74	5.9	14.5	.507	.57	.328
December	140	9.5	20.4	.915	1.05	.591
January	455	10	34.1	1.60	1.84	1.03
February	120	9.0	31.9	1.50	1.56	.969
March	40	12	17.1	.803	.93	.519
April	55	10	14.4	.676	.75	.437
May	45	7.0	13.3	.526	.61	.340
June	196	6.3	30.5	1.40	1.56	.905
July	605	8.2	75.5	3.52	4.06	2.28
August	220	10	25.7	1.20	1.38	.776
September	200	7.8	20.5	.962	1.07	.622
The year	605	5.9	25.8	1.17	15.84	.756
1945–46						
October	24	9.5	11.0	0.516	0.595	0.333
November	374	9.5	29.4	1.38	1.54	.892
December	414	14	43.9	2.06	2.38	1.33
January	53	16	23.9	1.12	1.29	.724
February	104	18	34.2	1.61	1.68	1.04
March	58	19	24.5	1.15	1.33	.743
April	24	13	15.3	.718	.801	.464
May	341	12	41.5	1.95	2.25	1.26
June	223	11	22.9	1.07	1.19	.692
July	38	10	13.5	.446	.514	.288
August	117	7.4	15.6	.563	.649	.364
September	37	8.8	14.1	.258	.288	.167
The year	414	7.4	24.1	1.07	14.51	.692
1946–47						
October	15	6.3	10.1	0.326	0.376	0.211
November	15	7.4	9.31	.368	.411	.238
December	70	6.6	14.7	.512	.590	.331
January	72	12	22.2	1.03	1.19	.666
February	16	8.6	13.0	.592	.616	.383
March	53	11	17.6	.822	.948	.531
April	22	11	13.0	.610	.681	.394
May	88	10	20.0	.878	1.01	.567
June	50	7.8	14.9	.573	.639	.370
July	49	7.8	14.4	.457	.527	.295
August	81	6.6	16.1	.405	.467	.262
September	103	6.6	18.2	.629	.702	.407
The year	103	6.3	15.3	.601	8.16	.388

Monthly discharge of Northwest Branch Anacostia River near Colesville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1947–48						
October	20	5.3	10.7	0.262	0.302	0.169
November	244	6.3	35.6	1.67	1.86	1.08
December	42	11	15.5	.615	.709	.397
January	375	11	35.6	1.66	1.91	1.07
February	395	11	38.9	1.83	1.97	1.18
March	132	15	28.9	1.36	1.57	.879
April	79	14	20.0	.939	1.05	.607
May	130	13	35.7	1.68	1.94	1.09
June	59	9.4	15.7	.732	.817	.473
July	60	9.0	14.9	.512	.590	.331
August	130	9.4	35.1	1.58	1.82	1.02
September	17	8.6	11.9	.285	.318	.184
The year	395	5.3	24.8	1.09	14.86	.704
1948–49						
October	39	8.2	14.3	0.535	0.617	0.346
November	343	8.7	40.1	1.87	2.09	1.21
December	372	16	51.0	2.36	2.72	1.53
January	279	22	54.2	2.53	2.92	1.64
February	181	27	51.5	2.42	2.52	1.56
March	242	23	39.3	1.84	2.12	1.19
April	100	18	28.2	1.32	1.47	.853
May	415	16	48.4	2.27	2.62	1.47
June	107	12	19.8	.873	.974	.564
July	31	10	15.9	.577	.665	.373
August	34	7.8	15.9	.394	.454	.255
September	23	8.2	15.6	.338	.377	.218
The year	415	7.8	32.7	1.44	19.55	.931
1949–50						
October	59	10	18.1	0.469	0.541	0.303
November	31	9.2	15.3	.437	.488	.282
December	57	13	17.2	.704	.812	.455
January	56	12	18.5	.653	.753	.422
February	142	17	36.1	1.56	1.62	1.01
March	272	16	33.7	1.46	1.68	.944
April	20	13	15.8	.742	.828	.480
May	171	13	29.6	1.39	1.60	.898
June	73	11	23.8	1.09	1.22	.704
July	57	10	16.6	.620	.715	.401
August	97	13	18.8	.484	.558	.313
September	194	9.6	31.7	1.36	1.52	.879
The year	272	9.2	22.8	.906	12.34	.586

POTOMAC RIVER BASIN—*Continued*

Monthly discharge of Northwest Branch Anacostia River near Colesville—*Continued*

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1950–51						
October	113	11	18.9	0.793	0.914	0.513
November	900	12	50.4	2.35	2.62	1.52
December	350	14	46.9	2.19	2.52	1.42
January	69	18	25.0	1.17	1.35	.756
February	308	22	48.6	2.24	2.33	1.45
March	130	19	32.0	1.50	1.73	.969
April	102	24	37.3	1.75	1.95	1.13
May	44	14	19.4	.869	1.00	.562
June	331	16	59.3	2.76	3.08	1.78
July	29	11	17.2	.610	.703	.394
August	24	7.4	14.3	.288	.332	.186
September	31	7.4	15.5	.154	.172	.100
The year	900	7.4	31.8	1.38	18.70	.892
1951–52						
October	22	9.5	16.9	0.189	0.22	0.122
November	91	9.2	20.1	.779	.87	.503
December	249	12	29.6	1.28	1.48	.827
January	100	18	35.4	1.66	1.91	1.07
February	177	16	28.4	1.33	1.43	.860
March	142	19	37.4	1.76	2.03	1.14
April	452	21	78.5	3.69	4.12	2.38
May	156	24	46.7	2.19	2.52	1.42
June	63	14	23.8	1.12	1.25	.724
July	109	12	21.5	.901	1.04	.582
August	86	11	18.8	.732	.84	.473
September	914	11	46.1	2.04	2.28	1.32
The year	914	9.2	33.5	1.47	19.99	.950

POTOMAC RIVER BASIN—*Continued*

Yearly discharge for Northwest Branch Anacostia River near Colesville

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1925	20.2	0.948	12.87	0.613	18.5	0.869	11.78	0.562
1926	19.1	.897	12.15	.580	23.3	1.09	14.82	.704
1927	23.6	1.11	15.03	.717	23.3	1.09	14.88	.704
1928	26.7	1.25	17.09	.808	21.7	1.02	13.87	.659
1929	20.4	.985	13.03	.619	20.9	.981	13.32	.634
1930	12.0	.563	7.68	.364	9.20	.432	5.87	.279
1931	8.45	.397	5.39	.257	8.36	.392	5.33	.253
1932	9.53	.447	6.08	.289	17.0	.798	10.86	.516
1933	29.3	1.38	18.64	.892	24.0	1.13	15.28	.730
1934	21.0	.986	13.35	.637	23.5	1.10	14.96	.711
1935	27.7	1.30	17.65	.840	26.9	1.26	17.14	.814
1936	28.7	1.35	18.32	.873	27.3	1.28	17.46	.827
1937	28.5	1.34	18.14	.866	35.2	1.65	22.42	1.07
1938	23.1	1.08	14.70	.698	16.0	.751	10.20	.485
1939	18.8	.883	11.96	.571	18.8	.883	11.98	.571
1940	15.8	.742	10.09	.480	16.9	.793	10.80	.513
1941	14.2	.667	9.03	.431	11.0	.516	6.98	.333
1942	8.65	.406	5.53	.262	13.5	.634	8.59	.410
1943	18.8	.883	12.0	.571	17.0	.798	10.83	.516
1944	14.1	.662	9.00	.428	13.6	.638	8.66	.412
1945	24.9	1.17	15.84	.756	28.7	1.35	18.28	.873
1946	22.7	1.07	14.51	.692	17.8	.836	11.37	.540
1947	12.8	.601	8.16	.388	15.1	.709	9.65	.458
1948	23.2	1.09	14.86	.704	27.2	1.28	17.41	.827
1949	30.6	1.44	19.55	.931	25.0	1.17	15.96	.756
1950	19.3	.906	12.34	.586	26.0	1.22	16.55	.789
1951	29.4	1.38	18.70	.892	23.9	1.12	15.20	.724
1952	31.3	1.47	19.99	.950				
Highest	31.3	1.47	19.99	.950	35.2	1.65	22.42	1.07
Average	20.8	.977	13.26	.631	20.4	.958	13.00	.619
Lowest	8.45	.397	5.39	.257	8.36	.392	5.33	.253

Note: All figures in Yearly table have been adjusted for diversion from Patuxent River.

26. Northwest Branch Anacostia River near Hyattsville

Location.—Water-stage recorder and concrete control, lat. 38°57′12″, long. 76°57′59″, on right bank at downstream side of Queens Chapel Road bridge, 1 mile west of Hyattsville, Prince Georges County, and 1 mile downstream from Sligo Branch. Datum of gage is 17.30 feet above mean sea level, adjustment of 1912. Prior to Oct. 22, 1938, wire-weight gage on bridge at same site and datum read twice daily. Oct. 22, 1938 to Sept. 17, 1951, water-stage recorder on left bank at same site and datum.

Drainage area.—49.4 square miles.

Records available.—July 1938 to September 1952. (July 1938 to September 1943 published in Bulletin 1; October 1943 to September 1950 in Bulletin 10).

Average discharge.—14 water years, (1939–52), 37.2 second-feet (unadjusted); 47.6 second-feet (adjusted for regulation and diversion).

Extremes.—Maximum discharge, 3,360 second-feet Sept. 1, 1952 (gage height, 11.4 feet, from floodmark); minimum, 0.8 second-foot Oct. 3, 7, 1941, Aug. 26, 1943.

Maximum stage known, about 13.5 feet on or about August 24, 1933.

Remarks.—Records good except those for periods of ice effect or doubtful or no gage-height record, which are fair, and those for 1939 which are poor. Low flow regulated by storage at Burnt Mills reservoir and diversion by filtration plant 7 miles above station. Records include inflow to headwaters pumped from Patuxent River since Aug. 12, 1939 to augment water supply for Washington Suburban Sanitary District.

Cooperation.—Records of diversions and change in reservoir contents furnished by Washington Suburban Sanitary Commission.

Monthly discharge of Northwest Branch Anacostia River near Hyattsville

Month	Discharge in second-feet				Runoff in inches	Discharge in million gallons per day per square mile
	Maximum	Minimum	Mean	Per square mile		
1951–52						
October	16	3.6	5.78			
November	229	7.2	33.0			
December	603	6.3	50.0			
January	229	16	64.3			
February	464	16	49.6			
March	360	20	69.8			
April	1,180	19	167			
May	344	32	99.9			
June	215	10	39.7			
July	371	7.4	28.5			
August	430	8.2	32.9			
September	1,550	5.6	66.6			
The year	1,550	3.6	58.8			

POTOMAC RIVER BASIN—*Continued*

Yearly discharge of Northwest Branch Anacostia River near Hyattsville

Year	Year ending Sept. 30				Calendar year			
	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile	Discharge in second-feet		Runoff in inches	Discharge in million gallons per day per square mile
	Mean	Per square mile			Mean	Per square mile		
1939	40.3	.816	11.09	0.527	40.6	.822	11.19	0.531
1940	36.3	.735	9.99	.475	38.9	.787	10.71	.509
1941	32.9	.666	9.04	.430	26.7	.540	7.32	.349
1942	27.6	.559	7.60	.361	41.2	.834	11.35	.539
1943	48.7	.986	13.35	.637	41.4	.838	11.37	.542
1944	36.1	.731	9.94	.472	35.6	.721	9.80	.466
1945	55.8	1.13	15.36	.730	62.4	1.26	17.10	.814
1946	49.2	.996	13.52	.644	39.1	.791	10.74	.511
1947	30.2	.611	8.29	.395	34.4	.696	9.45	.450
1948	56.9	1.15	15.65	.743	67.7	1.37	18.65	.885
1949	68.7	1.39	18.87	.898	55.3	1.12	15.20	.724
1950	45.1	.913	12.39	.590	58.2	1.18	16.02	.763
1951	63.7	1.29	17.51	.834	55.1	1.12	15.20	.724
1952	74.7	1.51	20.55	.976				
Highest	74.7	1.51	20.55	.976	67.7	1.37	18.65	.885
Average	47.6	.963	13.07	.622	45.9	.929	12.61	.600
Lowest	27.6	.559	7.60	.361	26.7	.540	7.32	.349

Note: All figures in Yearly table have been adjusted for diversion from Patuxent River and regulation and diversion at Burnt Mills Filtration Plant.

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PLATES

FIGURE 1. Flood Plain of Seneca Creek near Dawsonville, Md.

FIGURE 2. Joints and Bedding Planes in Setters Formation, near Marriottsville, Md.

PLATE VI

FIGURE 1. Gage House at Streamflow Measurement Station on Little Patuxent River at Savage, 400 feet downstream from U. S. Highway 1

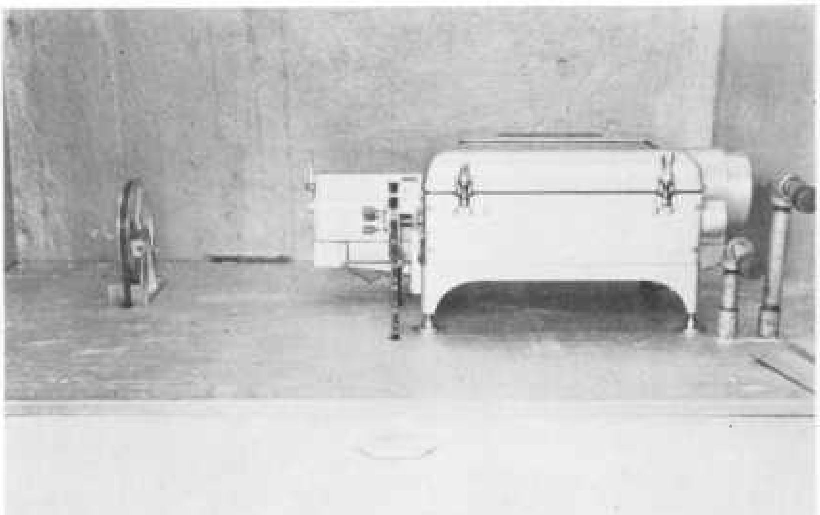


FIGURE 2. Automatic Water-Stage Recorder with Reference Tape Gage and Intake-Flushing Valve Handles in Gage House shown in Fig. 1

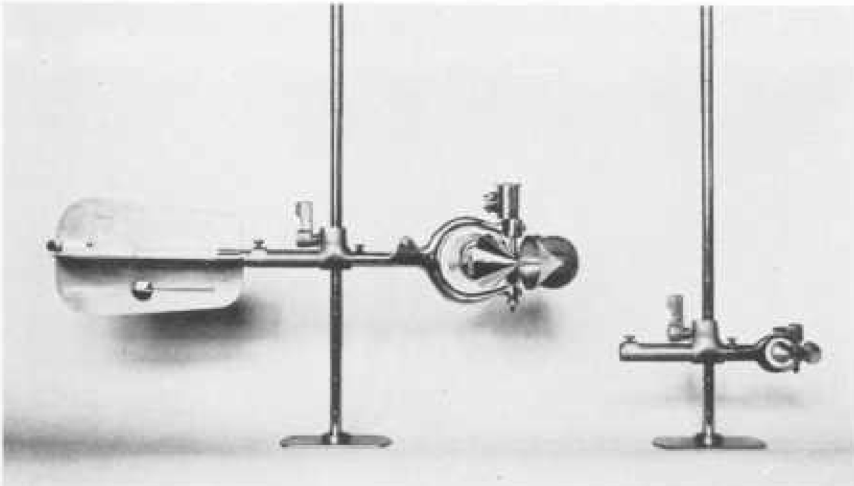


FIGURE 1. Price Standard Current Meter and Pygmy Meter, Suspended on Wading Rods, Used to Measure Discharge

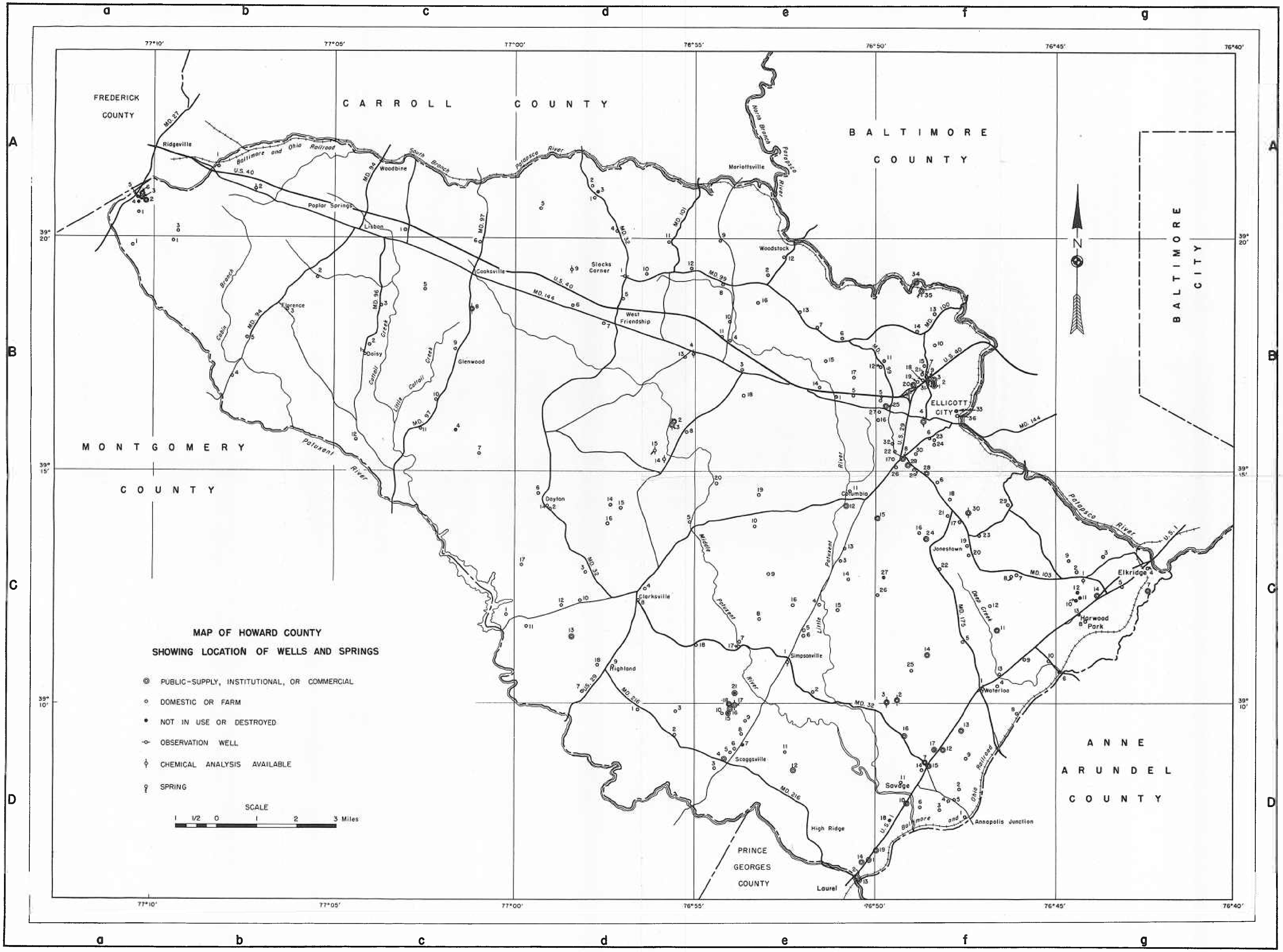
FIGURE 2. Highway Bridge Equipment, Used to Measure Discharge at Stages Higher than Wading

PLATE VIII

Typical Stream-Channel, Downstream from Gaging Station on Northwest Branch Anacostia River near Colesville, Md.

INDEX*

* Page numbers in *italics* indicate detailed descriptions.


MAP OF HOWARD COUNTY
SHOWING LOCATION OF WELLS AND SPRINGS
PUBLIC-SUPPLY, INSTITUTIONAL, OR COMMERCIAL
DOMESTIC OR FARM
NOT IN USE OR DESTROYED
OBSERVATION WELL
CHEMICAL ANALYSIS AVAILABLE
SPRING
SCALE
1 1/2 0 1 2 3 Miles
FREDERICK COUNTY
CARROLL COUNTY
BALTIMORE COUNTY
BALTIMORE CITY
MONTGOMERY COUNTY
ANNE ARUNDEL COUNTY
PRINCE GEORGES COUNTY
Ridgeville
Woodbine
Poplar Springs
Lisbon
Cooksville
Florence
Daisy
Glenwood
Marriottsville
Woodstock
Slacks Corner
West Friendship
ELLICOTT CITY
Dayton
Columbia
Jonestown
Elkridge
Harwood Park
Clarksville
Highland
Simpsonville
Waterloo
Scaggsville
Savage
High Ridge
Annapolis Junction
Laurel
Baltimore and Ohio Railroad
Patapsco River
Patuxent River
Middle Patuxent River
Little Patuxent River
Deep Creek
Cattail Creek
Little Cattail Creek
Cabin Branch
North Branch Patapsco River
South Branch
U.S. 40
U.S. 29
U.S. 1
MD. 27
MD. 94
MD. 97
MD. 32
MD. 101
MD. 99
MD. 144
MD. 96
MD. 100
MD. 103
MD. 175
MD. 216
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77°00′
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76°40′
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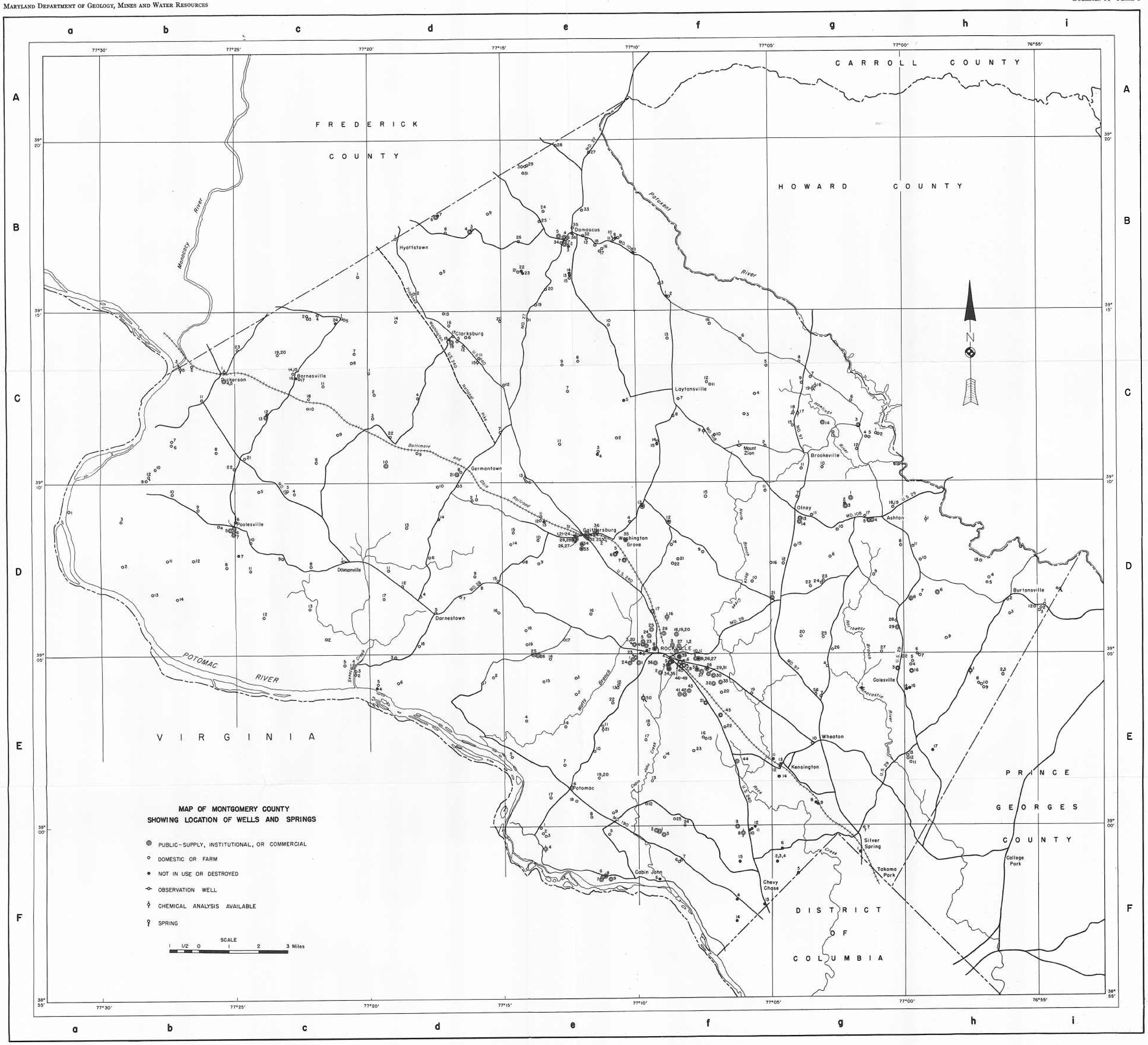
MAP OF MONTGOMERY COUNTY
SHOWING LOCATION OF WELLS AND SPRINGS
PUBLIC-SUPPLY, INSTITUTIONAL, OR COMMERCIAL
DOMESTIC OR FARM
NOT IN USE OR DESTROYED
OBSERVATION WELL
CHEMICAL ANALYSIS AVAILABLE
SPRING
SCALE
1 1/2 0 1 2 3 Miles
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F R E D E R I C K
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C A R R O L L C O U N T Y
H O W A R D C O U N T Y
P R I N C E
G E O R G E S
C O U N T Y
D I S T R I C T
O F
C O L U M B I A
V I R G I N I A
POTOMAC
RIVER
Monocacy River
Patuxent River
Hyattstown
Damascus
Clarksburg
Dickerson
Barnesville
Laytonsville
Germantown
Poolesville
Dawsonville
Darnestown
Gaithersburg
Washington Grove
Mount Zion
Brookeville
Olney
Ashton
Burtonsville
Rockville
Colesville
Wheaton
Kensington
Potomac
Cabin John
Chevy Chase
Silver Spring
Takoma Park
College Park
Baltimore and Ohio Railroad
77°30'
77°25'
77°20'
77°15'
77°10'
77°05'
77°00'
76°55'
39° 20'
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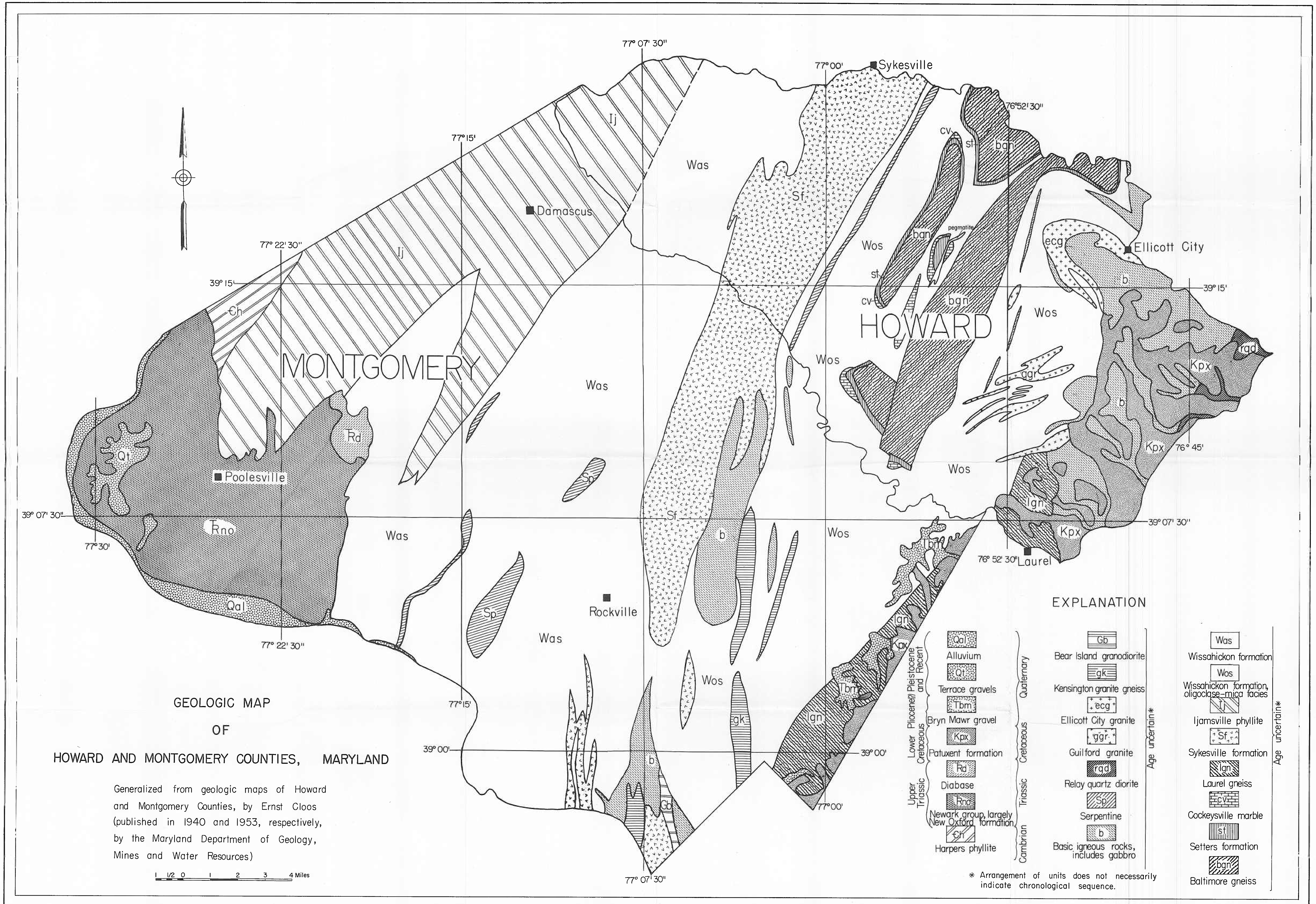
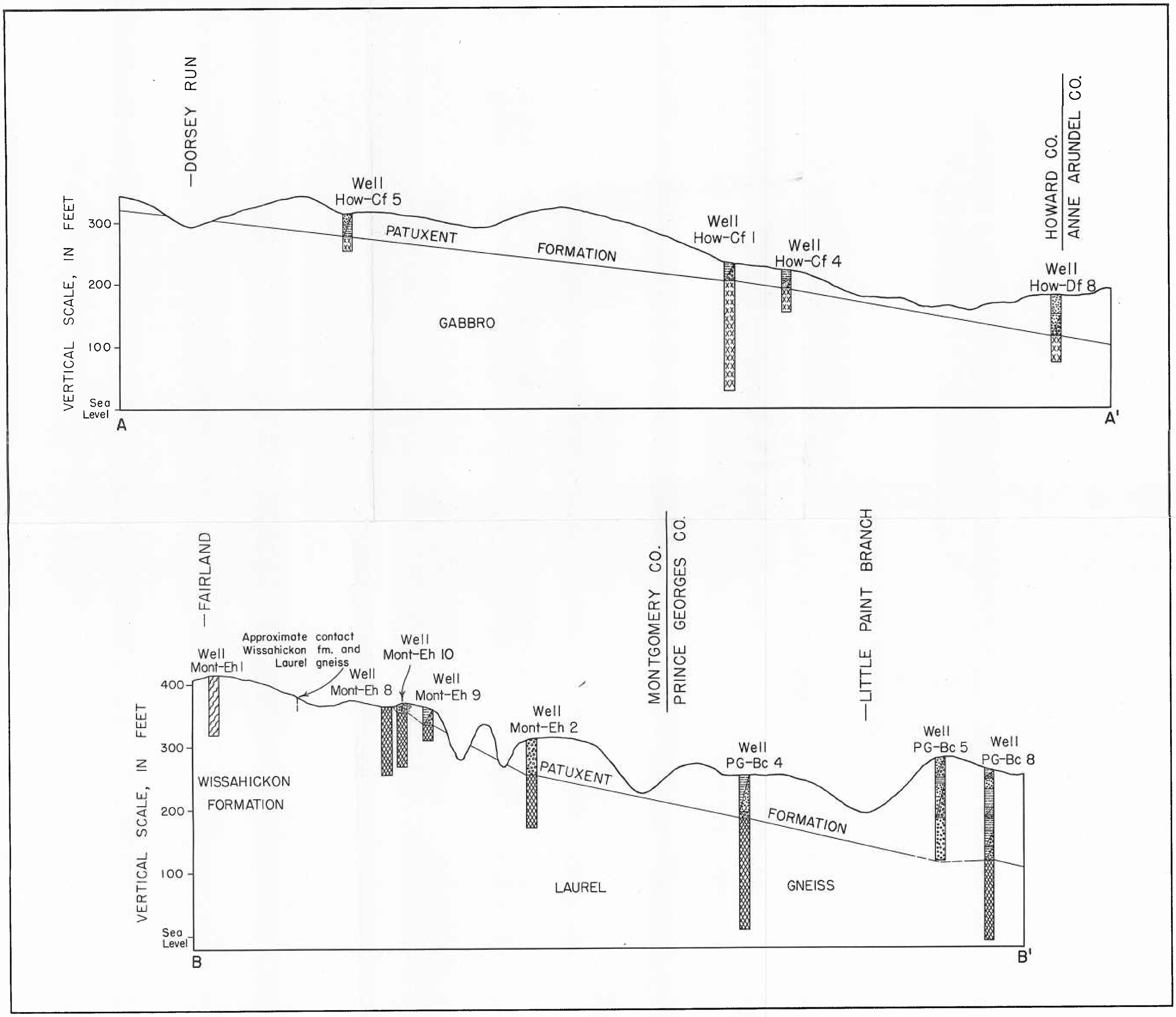
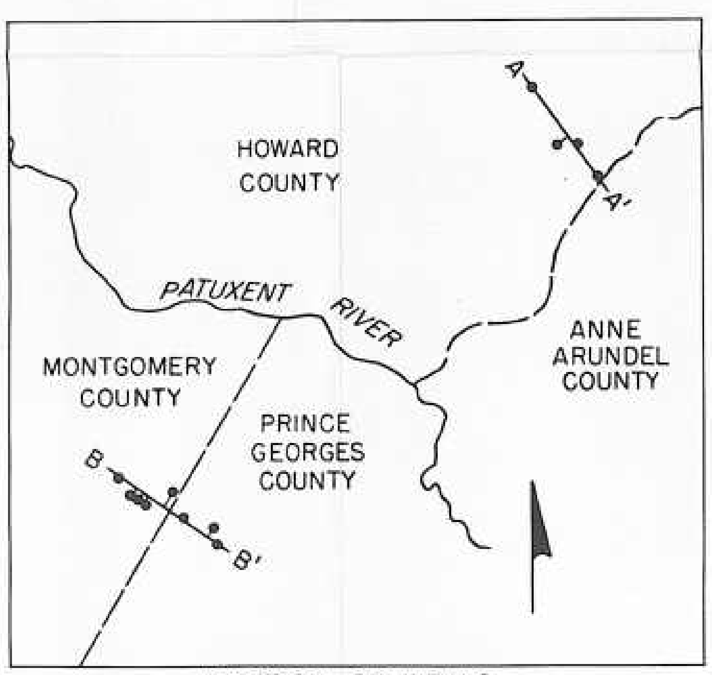

GEOLOGIC MAP
OF
HOWARD AND MONTGOMERY COUNTIES, MARYLAND
Generalized from geologic maps of Howard and Montgomery Counties, by Ernst Cloos (published in 1940 and 1953, respectively, by the Maryland Department of Geology, Mines and Water Resources)
1 1/2 0 1 2 3 4 Miles
MONTGOMERY
HOWARD
Sykesville
Damascus
Ellicott City
Poolesville
Rockville
Laurel
77° 07' 30"
77° 00'
76° 52' 30"
77° 15'
77° 22' 30"
77° 30'
76° 45'
39° 15'
39° 07' 30"
39° 00'
EXPLANATION
Qal Alluvium
Qt Terrace gravels
Tbm Bryn Mawr gravel
Kpx Patuxent formation
Rd Diabase
Rno Newark group, largely New Oxford formation
Ch Harpers phyllite
Pleistocene and Recent
Pliocene(?)
Lower Cretaceous
Upper Triassic
Quaternary
Cretaceous
Triassic
Cambrian
Gb Bear Island granodiorite
gk Kensington granite gneiss
ecg Ellicott City granite
ggr Guilford granite
rqd Relay quartz diorite
Sp Serpentine
b Basic igneous rocks, includes gabbro
Age uncertain*
Was Wissahickon formation
Wos Wissahickon formation, oligoclase-mica facies
Ij Ijamsville phyllite
Sf Sykesville formation
lgn Laurel gneiss
cv Cockeysville marble
st Setters formation
bgn Baltimore gneiss
Age uncertain*
* Arrangement of units does not necessarily indicate chronological sequence.
pegmatite





LOCATION OF WELLS USED IN CROSS SECTIONS

GEOLOGIC CROSS SECTIONS IN THE VICINITY OF THE FALL LINE IN EASTERN HOWARD COUNTY (A-A') AND EASTERN MONTGOMERY COUNTY (B-B')